

FLIGHT

The
AIRCRAFT
ENGINEER
&
AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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CONTENTS

	PAGE
Editorial Comment	
The Flight to Australia	1385
The Route to be Followed	1385
Cutting Down the Services	1386
The Future of the R.A.F.	1386
Flight—and the Men: Captain de Havilland	1387
The Camera and the 'Plane: Brighton	1389
The "Bristol" Coupé	1390
More N.P.L. Reports	1391
Royal Aero Club: Official Notices	1392
Some Friedrichshafen "Milestones"	1395
The Australian Government Flight Competition	1396
An Altitude Laboratory	1398
Honours	1404
Airisms from the Four Winds	1405
The Royal Air Force	1408
Personals	1409
London-Paris Air Services	1410

DIARY OF FORTHCOMING EVENTS.

Club Secretaries and others desirous of announcing the date of important fixtures are invited to send particulars for inclusion in the following list:

Nov. ... Entrance Examination for R.A.F. College.
Nov. 7-15... Olympia Motor Car Show.
Dec. 3 ... "The Air Force." Lecture by Air-Commodore
H. R. Brooke-Popham before R.U.S.I.
Dec. 19 to ... Paris Aero Show.
Jan. 4, 1920.

EDITORIAL COMMENT

THE most ambitious attempt on aerial records is now in the making. Captain Matthews and Sergeant Kay left Hounslow this week with the object of reaching Australia in a Rolls-Royce-engined Sopwith machine and gaining the prize of £10,000 offered by the Commonwealth Government for the first successful flight between England and the Antipodes. For the moment it is futile to talk of success or failure in a task which is undoubtedly a most searching test of mechanical and physical endurance; but, even so, we may venture the opinion that it is one which is

demonstrably within the compass of the well-found aeroplane of today, and we see no reason for thinking that either Captain Matthews, as the first ready for the start, or one or even more of the other three entrants will not accomplish a feat which even a couple of years ago would have been voted humanly impossible. The severity of the test may be judged from the fact that the last lap of the journey is one of no less than 1,750 miles, from Bandoeng, in Java, to Port Darwin, in Northern Australia. This alone is comparable in distance to the Atlantic flight, with the added factor that it comes after 10,000 miles of flying. Still, everything that organisation and foresight can accomplish to make the enterprise successful has been done. The Air Ministry and the Commonwealth Government, as well as the Royal Aero Club, under whose supervision the competition is being carried out, have combined to render every possible assistance to the daring competitors. The Air Ministry has arranged for fuel supplies *en route*, and is giving the services of personnel wherever available. In addition, it has carried out a survey of the route between Calcutta and Australia, and has investigated the meteorological problems and those of navigation, cable and wireless communications. The one direction in which organisation seems to fall short of perfection is in the matter of landing grounds. Arrangements, however, have been made for the use of the racecourses at Rangoon and Singapore to be used for landing, while the Netherlands Government has agreed to the use by competitors of its aerodrome at Bandoeng. But even when this route is followed machines will still have great distances to cover between landing stations, and in view of this the Air Ministry has suggested to competitors that their machines should be converted to seaplanes by the substitution of floats for wheels either at Calcutta or some other suitable place, so that, in the event of forced landings, the machines would be able to use the many available harbours and inlets along the route.

The Route to be Followed

The first section of the route to be taken is that followed a few months ago by Brig.-Gen. MacEwan and Major Maclaren, and crosses France, Italy and Malta to the north coast of Africa and on to Aboukir in Egypt. Thence to Karachi the route is that explored a year ago by General Salmond,

by way of Damascus, Baghdad, Basra and the coasts of Persia and Baluchistan. Over this section the landing grounds are said to be quite good, and landing in the desert is usually practicable in emergency, but the possible hostility of the natives, together with the shortage of water and the absence of methods of communication, add considerably to the risks of a forced landing. From Karachi the next stage is across India to Calcutta, by way of Nasirabad, Delhi and Allahabad. This is a comparatively easy stage, especially as the Indian Government has promised every possible assistance from the R.A.F. in India. Beyond Calcutta the competitors will be thrown upon their own resources so far as concerns the necessary supplies of fuel and spares, etc., in view of the fact that no British aerodromes exist. On the aeroplane route from Calcutta there is a landing ground at Akyab, 280 miles away, and there is no other available until the Rangoon racecourse is reached—a further 500 miles. There is another long stretch of more than 1,300 miles before Singapore is reached, where the only possible landing ground is the racecourse. After leaving Singapore the next possible stopping place is the Dutch Government aerodrome at Bandoeng. Thence to Port Darwin is 1,750 miles, of which 500 miles are over the sea. There are no aerodromes or possible landing-places for aeroplanes on this final stretch of the course. By converting the machines to seaplanes, as the Air Ministry has suggested, the number of available stopping-places on the final stages of the journey are multiplied very materially. There are practicable harbours all along the route, and by the adoption of the advice of the Ministry the competitors will ensure a stopping-place at least every 500 miles. The longest stretch would be from Koepang Bay to Port Darwin, a distance of 518 miles. Obviously, it would make for a far greater margin of safety, and would, therefore, contribute much to the possibilities of success to carry out the conversion recommended, and, although we are not in the secret of the competitors' intentions, it will probably turn out that the advice will be taken. However that may be, and whether the several competitors elect to chance things and accept the risks of the long non-stop flights by aeroplane, or to take what seems to be the more prudent course, the test is certainly one which will search out every weak point both of men and machines. If they fail, the failure will be a glorious one. If they succeed they will have erected a landmark in the history of aviation dwarfing everything that has been done before. We need hardly say that we wish every luck and success to Captain Matthews and his companion, and also to those who are preparing to follow them on their long trail.

Cutting Down the Services

The first task of Parliament, after purely routine business has been disposed of, will be to enquire how far the Prime Minister's precept to reduce expenditure to "£2,000,000 a day and not more" has been complied with. It does not seem, on the face of things, that economies have been effected on a sufficient scale to have brought the national expenditure down to the required level, nor does there appear to be too hopeful a prospect of effecting the needed reductions for some time to come. The new Departments created during the War are, as

everyone foresaw who was at all familiar with the ways and methods of officialdom, taking a great deal of rooting out—the limpets are clinging tightly to their rocks and intend to hang on until they are literally dragged from their anchorages. There has been a great show of cutting down the staffs in these war Ministries, but so far as it is possible to judge this has been to a large extent "eye-wash." The minor officials, whose salaries run low, and numbers of the women helpers have been dismissed, but the big men who draw the big money find themselves too comfortable and are hanging on to their jobs for all they are worth. It really looks as though we had been right a year or two ago when we said that, when the War was over, it would be harder to get rid of the new bureaucracy than it was to beat the enemy in the field.

In the meantime, there does seem to have been a serious effort made to cut down the expense of the fighting Services. The total cost of the three Services is being got down rapidly to the required level of £160,000,000 per annum, which is rather more than double the cost of the Navy and Army before the War. Manifestly, if this figure really is reached, there will be no further room for economy in that direction. There is now a third Service—the R.A.F.—to be estimated for, and when we come to regard the vastly-increased pay of officers and men in all three, and the much greater costs of material of all kinds, the thought must arise whether we are not going to an extreme and cutting our means of defence too fine. Of course, we have no longer to provide against the German menace, and, so far as it is humanly possible to foresee, the horizon seems clear and another great war no more than a remote possibility. It should not be forgotten, however, that great wars break out suddenly and without any period of warning which will enable the country which is unprepared to make good the deficiencies of neglect. What our own state of unpreparedness cost us in the late War it would be futile to discuss—it cannot be estimated, but we know it was a stupendous total of life and treasure. Indeed, there are some authorities who say with certitude that if we had been able to throw a million men into the field in the first month of European war, properly trained and equipped, Germany would never have taken the risk she did, and the world would have been spared the horrors of the greatest war in history. However, these speculations are perhaps idle now, but they are interesting, nevertheless.

The Future of the R.A.F.

Naturally, in this drastic cut at the expense of the fighting Services, we are more keenly interested in what is happening to the R.A.F. than to the others. It certainly does not seem that an annual expenditure of £25,000,000 on aerial defence is exactly a lavish provision. Still, we are not inclined to quarrel with it on the score of inadequacy, if only because we realise that the nation cannot at present afford to waste a shilling on unnecessaries, and what we simply cannot pay for we must do without. The principal thing to be seen to now is the getting of value for every penny spent on the R.A.F. After all, even when the present cost of material is taken into account, £25,000,000 is a substantial sum of money, and a great deal can be done with it if it is



Captain GEOFFREY DE HAVILLAND, A.F.C., O.B.E., Technical Director of the Aircraft Manufacturing Co., Ltd., Designer of the Airco De H. Machines

wisely expended. In order that we may get the best value in defence, we would urge again that a great part—we will not say the bulk—of the money voted for the services of the Air Ministry should be devoted to the encouragement of civilian aviation in such a manner as at the same time to build up a properly trained and equipped Flying Reserve against another *dies iræ*. We are most firmly convinced that this is the way not only to get the best value for our money, but would really result in a far more efficient war machine in the end than as though we spent the money in keeping up a large active fighting force. At the same time, aviation at large would develop at a much faster rate than as though it were left to private enterprise alone, and we should get our reward in increased wealth due to better and faster communications.

The fighting man pure and simple is a parasite on the community—we do not use the term in any offensive sense, but it is, nevertheless, the only one that illustrates the point. He produces nothing, but takes from the community in the shape of pay,

allowances, subsistence and so forth—he is an absolute charge and returns nothing, unless he can be found productive work while waiting to carry out his proper function of making war. As he is seldom making war, it follows that he is nearly always a charge on the community, remunerative, it is true, since he guarantees the community against danger. Therefore, if in the intervals of making war he can be made productive, he not only ceases to be a dead charge, but becomes a valuable asset apart from that connoted by his readiness to fight in defence of the community. In aviation the opportunity for making him into a productive asset exists to a far greater extent than in the other Services. You cannot make the infantry man a producer. It is difficult—impossible, indeed, to make a fighting marine service productive, since the requirements of a fighting and a mercantile navy are absolutely dissimilar. But you can under a system of a well thought-out Flying Reserve make the soldier of the air a producer, and it is that system which must be invoked now.



The International Air Convention

It was announced from Paris on October 14 that thirteen Allied Powers had signed at the French Foreign Office the International Air Convention; the United States and Japan were not included among the signatories.

It may be recalled that the regulations under the International Air Convention were published in *FLIGHT* of July 31.

Service Dress Uniform for Officers

THE Air Ministry announces that a new pattern Service uniform for officers of the Royal Air Force has been approved by His Majesty the King.

The change of uniform has been decided upon because it was found that the colour of the lighter shade was not sufficiently durable in wear and was liable to fade. Apart from the colour, however, the only variations from the previous pattern are as noted below.

- (1) Substitution of black and blue braid for distinguishing ranks on the sleeve instead of the present gold braid.
- (2) Drab pilots' or observers' badges instead of gold.
- (3) Abolition of gold embroidery round peak of cap. The peak of the cap will now be of the same material as the crown of the cap.

Officers will not be required to purchase the new uniform until they need to replace, owing to wear, the blue or khaki uniform, now in use, but have been informed that no more of the old pattern uniform should be purchased.

Jackets, trousers, and caps will be made of the baratheia, though there would be no objection to whipcord of the usual weights being utilised for this purpose if manufacturers can supply such to the correct shade.

Breeches will be made of cavalry twill.

For the present the existing pattern blue greatcoat may be worn, but steps are being taken to provide a suitable cloth of the new shade.

The remarks relating to the greatcoat also apply to the raincoat.

Patterns of the complete garments and of materials used (cloth, braid, buttons and buckle) can be seen on application to Room 177, Air Ministry, Kingsway, London, W.C.2. The buttons and buckle are the same as on the old pattern blue uniform. Patterns have also been sent to the Chambers of Commerce of the following towns:—

Bradford, Leeds, Huddersfield, Halifax, Galashiels, Glasgow, Manchester, London, Troubridge and Bristol.

R 80 Nearing Completion

WORK is now in full swing again on the R 80 at Barrow-in-Furness, and it is anticipated that it will be possible to complete the vessel by Christmas in readiness for her to be handed over to the Admiralty. The frame work of the vessel is finished, the planes and rudders in position and tanks fixed, while the cars now only await the engines.

R 34 to Come South Again

It is understood that the R 34, which, now that Maj. Scott has been demobilised, is commanded by Col. Hicks, will when the East Fortune airship station is closed be transferred to Pulham aerodrome, Norfolk.

Waste at Andover

It was asserted by the chairman at the last meeting of the Andover Guardians that enough wood is being wasted at Andover Aerodrome to provide the town with fuel all through the winter. There was a big heap of hangar material—containing wood good enough for building purposes—which was being left to rot and was at present harbouring 500 to 600 rats! It was unanimously decided to send a strong resolution of protest against such waste to the Air Ministry and the Government.

The Royal Aeronautical Society

As announced in our last issue, the new session of the Royal Aeronautical Society will open on Wednesday, October 29, and the following is the programme for the first four meetings:—

Wednesday, October 29.—“The Static Head Turn Indicator for Aeroplanes,” by Sir Horace Darwin, K.B.E., M.A., F.R.S. Chair to be taken by Brig.-Gen. R. K. Bagnall Wild, C.M.G., C.B.E., R.E.

Wednesday, November 12.—“Some Physical and Psychical Effects of Altitude,” by Chas. Atkin Swan, L.R.C.P., M.R.C.S., M.B., Ch.M. Chair to be taken by Sir W. Arbuthnot Lane, Bart., C.B., F.R.C.S.

Wednesday, November 26.—“Some Kite Balloon Experiments,” by Griffith Brewer. Chair to be taken by Brig.-Gen. E. M. Maitland, D.S.O.

Wednesday, December 10.—“Aircraft Undercarriages,” by J. D. North. Chair to be taken by Lieut.-Col. M. O'Gorman, C.B.

In each case, a discussion will follow the reading of the paper. The meetings will be held at the Royal Society of Arts, John Street, Adelphi, commencing at 8 p.m. Tickets can be obtained upon application to the Secretary, 7, Albemarle Street, W. 1.

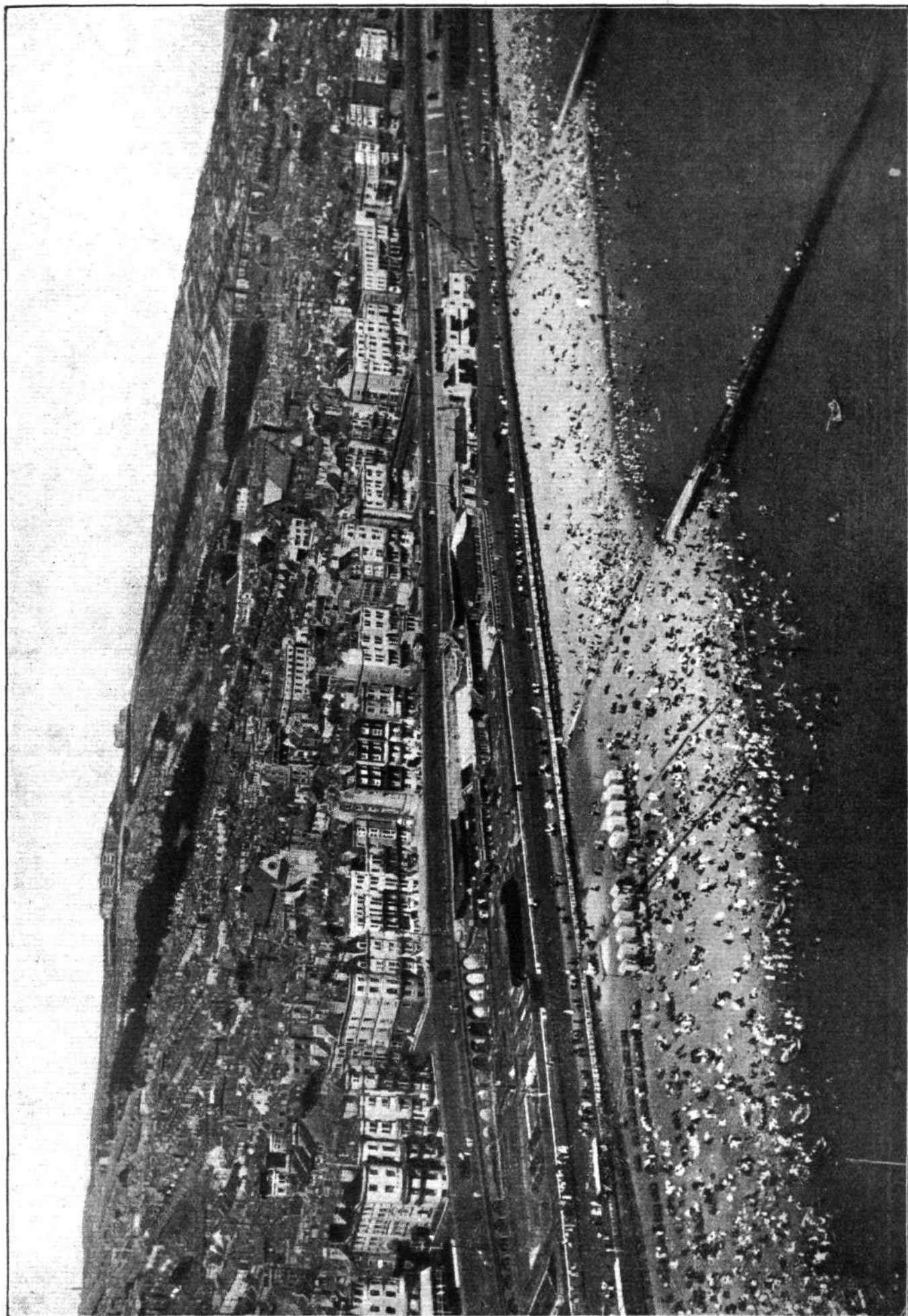
The American Trans-Continental Race

IN spite of rumours to the contrary, it was decided to complete the race for United States service aviators, the first stage of which was described in our last issue. Lieut. Maynard set out from San Francisco to fly to New York, and on October 14 he reached Sidney, having flown, with the aid of a following wind, the 93 miles from Cheyenne in 33 min. The next day he went on but a broken crankshaft brought him down at Omaha, Nebraska. There he was able to obtain the use of a Liberty engine from a wrecked machine, and so was able to get on. He landed at Mineola on the afternoon of October 18.

Capt. Smith, returning from New York to San Francisco, reached Buffalo on October 14, but while his mechanics were attending to the machine it caught fire and was completely destroyed. Another machine, piloted by Lieut. Kirby, with Lieut. Miller as observer, fell in Utah, and both occupants were killed.

Lieut. Maynard was flying a D.H. or Airco 4 machine, designed by Capt. Geoffrey de Havilland, the technical director of the Aircraft Manufacturing Co., Ltd., this machine having been adopted by the United States on entering the war as one of their standard types.

The Camera and the 'Plane



Brighton, as viewed from an Avro biplane

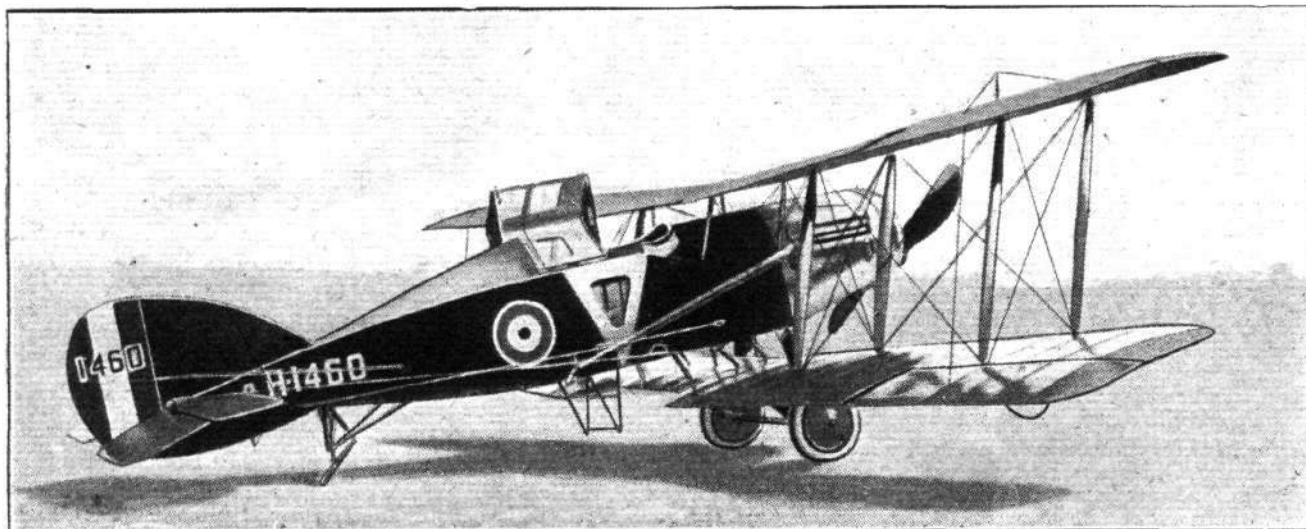
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THE "BRISTOL" COUPÉ: 275 H.P. ROLLS-ROYCE FALCON

DURING the War the "Bristol" aeroplanes, notably the Bristol Fighter, type F. 2 B, have established an excellent reputation for performance, stability and ease of handling. As every pilot who has flown the F. 2 B knows, this machine is exceptionally easy

render it particularly suitable for commercial flying, especially as it combines with this stability an excellent performance, both as regards speed and climb.

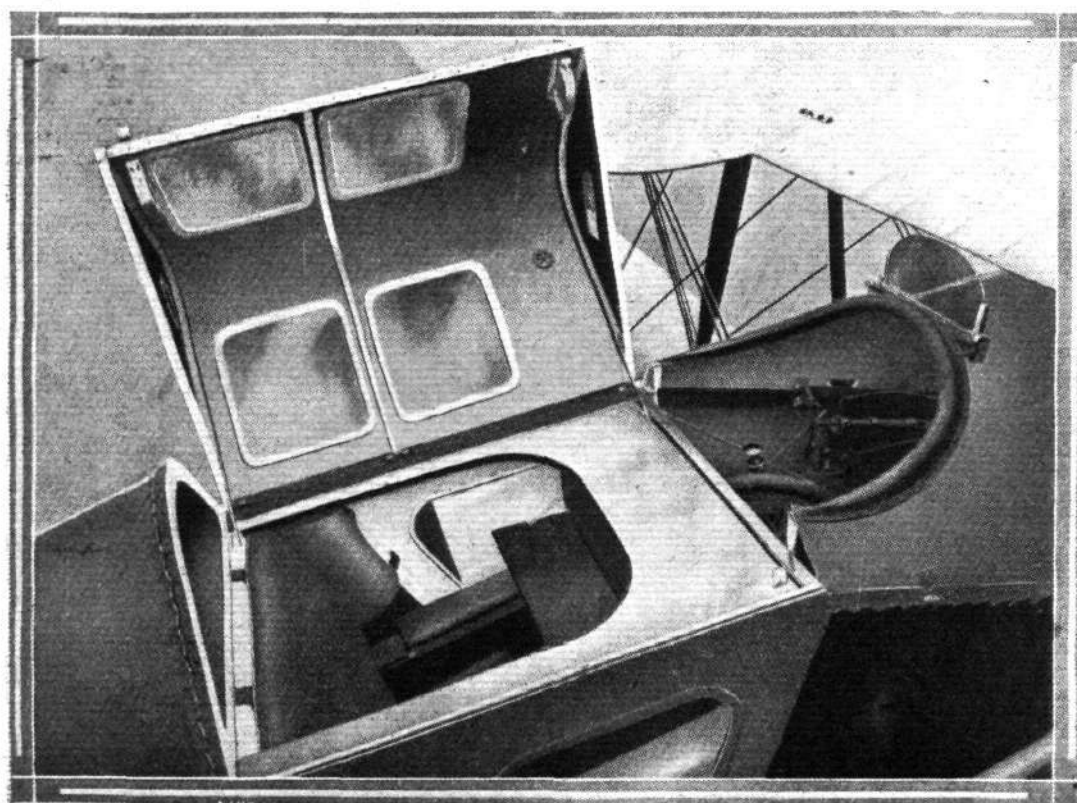
From the illustration it will be seen that the Coupé is to all intents and purposes an F. 2 B, in which the



THE "BRISTOL" COUPÉ, 275 H.P. ROLLS-ROYCE FALCON III ENGINE : Three-quarter rear view

to fly in straightforward flight, having a very great amount of inherent stability, and yet it is sufficiently quick on the controls to respond readily and perform any manœuvre required in aerial fighting. For civilian flying stability is of far more importance than manœuvrability, and as the "Bristol" Coupé illustrated below is a development of the F. 2 B, it may safely be assumed that its stability is as good as was that of the War machine. This fact should

gunner's seat, gun ring, and other paraphernalia of the trade have disappeared to give room for a comfortable cabin in which the passenger is completely protected from the wind. The pilot, as before, sits in the front seat, from which he has an excellent view, while at the same time he is well protected from the weather by means of suitably shaping the cowl around his cockpit and by a wind screen. Thus by the simple expedient of adding a roof to the rear portion of the



The "Bristol" Coupé : View into the passenger's cabin.

fuselage the machine is converted from an up-to-date fighting machine into an equally up-to-date touring aeroplane.

With regard to the machine as an aeroplane, there is really no need for any comment, since it follows so closely the lines of the standard F. 2 B which is already well known. The main feature distinguishing the F. 2 B from other two-seater fighters, and which has been retained in the Coupé, is the high placing of the *fuselage*. Instead of attaching the two halves of the bottom plane to the sides of the *fuselage*, as is the usual practice, the bottom plane runs right through underneath the body. In this manner the maximum cross section of the body has been kept comparatively small, with, it may be assumed, a considerable saving in body resistance. It is, we think, to a very great extent to this arrangement that the "Bristol" owes her good performance and stability.

Dealing with the cabin of the "Bristol" Coupé, this, although small, is very comfortable, the seat being well upholstered and the head room sufficient for all practical purposes. The cabin is entered from the top, the roof being hinged along the top port *longeron*, as shown in the illustrations. Not only the sides of the cabin but also the hinged roof is provided with windows so that the passenger can look sideways and downwards through the side windows and upwards through the skylight. There is, further, a small window in the front wall of the hinged roof, through which the passenger can give his instructions to the pilot, communication being facilitated, if desired, by the employment of a speaking-tube. Small cupboards are provided both in the front

and in the rear of the cabin, suitable for the stowage of light luggage, while the upholstered arm rests are hinged to give access to two smaller receptacles in which may conveniently be placed papers and other light articles likely to be wanted during the journey.

Hinged to the front wall of the cabin is a small writing-desk, which folds up flat against the wall when not in use. To ensure thorough ventilation of the cabin, adjustable ventilators have been fitted in the roof, ensuring that even during a long flight the air is fresh and pure. To the business-man who has to do a great amount of travelling the "Bristol" Coupé should offer an excellent means of doing so in comfort and at great speed. A very complete set of instruments is provided with this machine, including compass, altimeter, revolution indicator, air speed indicator, electric lighting set, starting magneto, oil pressure gauge, air pressure gauge, radiator thermometer, watch, cross level, and a Rolls-Royce doping pump with reservoir. The weight of the machine empty is 1,700 lbs.; fully loaded (including 200 lbs. of luggage), 2,800 lbs. The wing span is 39 ft. 3 in., and the overall length 25 ft. 9 in.; the maximum height is 10 ft. 1 in., and the total wing area 405 square ft. At ground level the maximum speed is 128 m.p.h., at 5,000 ft. 125 m.p.h., and at 10,000 ft. 115 m.p.h. The machine climbs to 6,000 ft. in 5 minutes, to 10,000 ft. in 11½ minutes, and to 15,000 ft. in 21½ minutes. The landing speed is 48 m.p.h. These figures relate to the machine as fitted with a 275 h.p. Rolls-Royce Falcon engine. If desired it can be modified to take either of the following engines: 300-h.p. Hispano-Suiza, 200 h.p. Hispano-Suiza, 240 h.p. B.H.P. (Siddeley) Puma.

◆ ◆ ◆ MORE N.P.L. REPORTS AVAILABLE (LIST NO. 2)

In our issue of July 3, 1919, we published a list of Advisory Committee Reports which were then published for the first time since the War. These reports were placed on sale by His Majesty's Stationery Office, and were published separately so that it was possible for those interested to purchase only those reports containing subjects in which they were specially concerned. We have now received a further list of reports issued, which also may be obtained from His Majesty's Stationery Office. In the following list the reports and memoranda numbers are given in brackets at the end of each publication, as are also the dates and prices.

Conditions at the Surface of a Hot Body Exposed to the Wind. By G. I. Taylor, M.A. Presented by the Superintendent, Royal Aircraft Factory. (272, May, 1916. Price 2d.)

The R.A.F. Chart. Presented by Superintendent, Royal Aircraft Factory. (280, July, 1916. 4d.)

Note Relative to the Weight of Hydrogen. By Guy Barr, B.A., B.Sc., and E. A. Owen, B.A., M.Sc. (293, January, 1917. 2d.)

Notes on Cellulose Acetate. By Guy Barr, B.A., D.Sc., and L. L. Bircumshaw. (303, revised, June, 1916, to November, 1917. 2d.)

The Lateral Stability of an Aeroplane Over the Whole of Its Speed Range. By E. F. Relf, A.R.C.Sc. (327, March, 1917. 6d.)

Exploration of the Airspeed in the Airscrew Slipstream of a Tractor Machine. Presented by the Superintendent, Royal Aircraft Factory. (438, November, 1917. 6d.)

The Construction of the R.A.E. Experimental Variable Pitch Airscrew. Presented by the Controller of the Technical Department, Aircraft Production. (471, April, 1918. 4d.)

Methods Employed at the Royal Aircraft Establishment for the Experimental Determination of the Ultimate Strength of Aeroplane Structures. By Wm. D. Douglas, A.R.C.Sc.I., and A. W. Clegg, B.Sc., of the R.A.E. Presented by the Controller of the Technical Department, Aircraft Production. (476, June, 1918. 9d.)

Tests on a Complete Model of R.E. 8. By E. F. Relf, A.R.C.Sc., and T. Lavender. (515, August, 1917. 6d.)

Some Further Notes on the Hydrogen Permeameter. By Dr. G. A. Shakespeare. (516, August, 1917. 3d.)

Equilibrium of the M Type Caquot Balloon, Based on the Results of Wind Channel Experiments given in the Advisory Committee's Report, R. and M. 247. By Lieut. E. G. Walker, R.N.V.R. (535, March, 1918. 4d.)

Note on a Possible Economy of Solvent in Doping Aeroplane Wings. By Guy Barr, B.A., D.Sc., and Edith G. Wilson, B.A., Sc.B. (539, May, 1918. 1d.)

The Best Gliding Angle in Space for an Aeroplane in a Wind, the Engine being Shut Off. By the Aerodynamics Staff of the R.A.E. Presented by the Controller of the Technical Department, Aircraft Production. (544, September, 1918. 1s. 3d.)

The Bending, Vibrating and Whirling of Loaded Shafts. By J. Morris, B.A., Captain, R.A.F. (551, October, 1918. 9d.)

On the Action of Wind on Flexible Cables, with Applications to Cables Towed Below Aeroplanes, and Balloon Cables. By A. R. McLeod, M.A. Presented by Controller, Technical Department, Aircraft Production. (554, October, 1918. 6d.)

A Description of a Hot-Wire Anemometer which is Sensitive Over a Large Range of Wind Speed. By A. Fage, A.R.C.Sc. (556, November, 1918. 4d.)

Investigation of the Wind Forces and Moments Acting on a Model of Mark III Type Kite Balloon. By L. F. G. Simmons, B.A., A.R.C.Sc., and R. A. Frazer, B.A., B.Sc. (561, September, 1918. 6d.)

Tests with Two Model Monoplanes of the Woyevodsky Type. By L. F. G. Simmons, B.A., A.R.C.Sc. and E. Ower, B.Sc. (571, January, 1919. 4d.)

The Effect of Aspect Ratio and Shape of Wing Tip on Aerofoil Characteristics. By H. Glauert, of the Royal Aircraft Establishment. Presented by the Controller, Technical Department, Department of Aircraft Production. (575, January, 1918. 3d.)

Analysis of Phugoids Obtained by a Recording Airspeed Indicator. By H. Glauert, of the Royal Aircraft Establishment. Presented by the Controller, Technical Department, Department of Aircraft Production. (576, January, 1918. 2d.)

Engine Sub-Committee Reports

Notes on the Sparking of Two Spark Gaps in Series. Simple Theory of the Process. By C. C. Paterson, M.I.M.E., and N. R. Campbell, ScD. (28, February, 1918. 4d.)

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

First Direct Non-Stop Trans-Atlantic Flight

THERE has been a wide-spread expression of opinion that the first direct Trans-Atlantic Flight by Sir John Alcock and Sir Arthur Brown on a Vickers-Vimy-Rolls Biplane on June 14-15, 1919, should be permanently recorded in the Club House.

The idea has been fully considered by the Committee and they have decided to obtain portraits in oils, for hanging in the Club, of both Sir John Alcock and Sir Arthur Brown.

Sir John Lavery has very kindly consented to paint the portraits at a purely nominal figure, the canvases being 30 ins. by 25 ins.

A subscription list has been opened and subscriptions limited to £1 is. are invited towards the cost.

Society of British Aircraft Constructors and the Royal Aero Club

A Meeting of the Joint Standing Committee of the Society of British Aircraft Constructors and the Royal Aero Club was held at the Royal Aero Club, 3, Clifford Street, London, W.1, on Wednesday, October 8, 1919, when there were present:—Royal Aero Club: Lieut.-Col. F. K. McClean, in the Chair, Lieut.-Col. Alec Ogilvie and Harold E. Perrin, Secretary (Representing Royal Aero Club); Society of British Aircraft Constructors: Capt. P. D. Acland, Mr. Hamilton Fulton; In attendance: Mr. G. Holt Thomas and Charles V. Allen, Secretary (Representing Society of British Aircraft Constructors).

Australian Flight.—It was reported that the alighting ground at Singapore was on the Race Course and from the information received from General Borton, who had surveyed the route, it was considered suitable.

Royal Aero Club Seaplane Competition.—It was decided to recommend that the Competition which had been postponed owing to the Railway Strike, be further postponed till next year.

SPECIAL COMMITTEE MEETING

A Special Meeting of The Committee was held on Wednesday, October 15, 1919, when there were present:—Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., in the Chair, Mr. Ernest C. Bucknall, Lieut.-Col. F. K. McClean, Lieut.-Col. J. T. C. Moore-Brabazon, M.P., Lieut.-Col. Alec Ogilvie, Group Capt. C. R. Samson, C.M.G., D.S.O., R.A.F., and the Secretary.

Royal Aero Club Seaplane Competition.—The recommendation of the Joint Standing Committee of the Royal Aero Club and Society of British Aircraft Constructors was received and it was decided to postpone the Competition till next year.

FLYING SERVICES FUND COMMITTEE

A Meeting of the Flying Services Fund Committee was held on Friday, October 17, 1919, when there were present:—Group Capt. C. R. Samson, C.M.G., D.S.O., R.A.F., in the Chair, Mr. Chester Fox, Squadron Leader T. O'B. Hubbard, M.C., R.A.F., and the Secretary.

Grants and Allowances.—The following Grants and Allowances were made:—

(33) An allowance of £2 a month for six months to the widow of a 2nd Class Air-Mechanic in the Royal Flying Corps killed on active service.

(89) An allowance of £2 a month for six months to the widow of a Private in the Royal Flying Corps killed on active service.

(119) An allowance of £2 a month for six months to the widow of a Flight-Sergeant in the Royal Air Force who died on active service.

(122) The School Fees up to £10 of the son of the widow of a 2nd Class Air-Mechanic in the Royal Flying Corps killed on active service.

(159) An allowance of £2 a month for six months to the mother of a 2nd Class Air-Mechanic in the Royal Naval Air Service killed on active service.

(168) An allowance of £3 a month for six months to the mother of a Private in the Royal Air Force who died on active service.

(173) An allowance of £2 a month for three months to the widow of a 3rd Class Air-Mechanic in the Royal Air Force who died on active service.

(190) An allowance of £2 a month for six months to the mother of a 2nd Class Air-Mechanic in the Royal Air Force who died on active service.

(254) An allowance of £2 a month for six months to the father of a 1st Aircraftsman in the Royal Air Force who died on active service.

(261) A grant of £14 12s. 6d., an allowance of £3 a month for six months, and the school fees of the son of the widow of a Corporal in the Royal Air Force killed on active service.

(266) An allowance of £1 a month for six months to the widow of a 2nd Class Air-Mechanic in the Royal Air Force who died on active service.

(267) A grant up to £31 10s. to a Flight Cadet in the Royal Air Force incapacitated on active service.

(269) An allowance of £2 a month for six months and the school fees of a daughter of the mother of a Sergeant in the Royal Air Force killed on active service.

(270) An allowance of £2 a month for six months to the mother of a Corporal in the Royal Air Force who died on active service.

(271) A grant of £5 and an allowance of £4 a month for six months to the widow of a Sergeant in the Royal Air Force who died on active service.

Australian Flight

Captain Matthews on a Sopwith commenced his flight to Australia, in an attempt to win the Prize of £10,000 offered by the Australian Government, on Tuesday, October 21, 1919. Prior to the start, the machine was marked by the Officials of the Royal Aero Club, and his official starting time was 11.44 a.m., taken by Mr. Stevenson of the Royal Aero Club.

Coupe Deutsch de la Meurthe

The Aero Club de France has provisionally awarded the Coupe Deutsche de la Meurthe to M. Sadi Lecoq who completed the circuit of about 200 kilometres embracing Terrasse de St. Germain, Senlis, Meaux, Melun, Terrasse de St. Germain, on October 15, 1919, at an average speed of 249 kilometres 719 metres an hour. In order that a new Competitor may become the provisional holder of the Cup it is necessary for this speed to be beaten by one-tenth.

Trans-Pacific Flight

The following Rules have been received from the Aero Club of America:—

Mr. Thomas H. Ince, of Culver City, Cal., has offered through the Aero Club of America, a fifty thousand dollar prize for a flight across the Pacific Ocean, to be awarded to the aviator who shall first complete an aerial voyage across the Pacific Ocean in a heavier-than-air machine, between the months of September, 1919, and February, 1920, inclusive. Contestants must complete the trans-Pacific flight within 288 hours from the time of starting. This flight may be attempted from either side of the ocean under the condition which have been drawn up and which are as follows:—

No part of the entrance fees are to be received by Thomas H. Ince. All such entrance fees will be applied toward payment of the expenses of the Pacific Aero Club in conducting the contest. Any balance not so expended will be refunded to the contestants *pro rata*.

STARTS

The start of contestants may be from land or water, but in the latter case, the contestants must cross the coast line at the beginning and end of the flight. The time will be taken from the moment of leaving the land or crossing the coast line. Each contestant shall advise the Pacific Aero Club of the proposed date and time of his start, as all starts must be made under the supervision of an official or officials of the above-mentioned Club.

AIR MILEAGE

Ninety-five per cent. of the mileage travelled from starting point to finish must be accomplished in the air. Barograph officially sealed, and opened only in the presence of an accredited representative of the Pacific Aero Club shall be

attached to each aircraft before starting. The recordings of these barographs shall determine the air mileage actually travelled.

TOWING

Towing is not prohibited.

STOPPAGES

Stops and landings, either on the water or at any point *en route*, may be made by the contestants.

IDENTIFICATION OF AIRCRAFT

Only one aircraft may be used for each attempt. It may be repaired *en route*. Each aircraft will be so marked before starting that it can be identified on reaching its destination.

FINISH

The finish may be made on land or water. The time will be taken at the moment of crossing the coast line in flight or touching land. Each contestant shall advise the Pacific Aero Club of his proposed destination and alighting place.

GENERAL

(1) A contestant by entering thereby agrees that he is bound by the regulations herein contained or to be hereafter issued in connection with this contest.

(2) The interpretation of these regulations or of any to be hereafter issued will rest entirely with the official committee of the Pacific Aero Club.

(3) The contestant shall be solely responsible to the Officials for the due observance of these regulations, and shall be the person with whom the officials will deal in respect thereof or of any question arising out of this contest.

(4) A contestant by entering waives any right of action against the Fédération Aéronautique Internationale, the Aero Club of America, the Pacific Aero Club, or Thomas H. Ince, for any damages sustained by him in consequence of any act or omission on the part of the officials of any of the above-mentioned clubs or Thomas H. Ince, or their representatives or servants or any fellow contestant.

(5) The aircraft used shall at all times be at the risk in all respect of the contestant, who shall be deemed by entry to agree, to waive all claim for injury either to himself, or his passengers, or his aircraft, or his employees or workmen, and to assume all liability for damage to third parties or their property, and to indemnify the above-mentioned clubs and Thomas H. Ince in respect thereof.

Rules and Regulations for the Thomas H. Ince Trans-Pacific Flight

Thomas H. Ince offers the sum of fifty thousand dollars to the aviator who shall first complete an aerial voyage across the Pacific Ocean, in a heavier-than-air machine, mechanically

group of islands, or the continent of Asia, and the finish must be on the mainland of the United States of America. The course of said flight must be confined to latitudes 49 degrees north and 32 degrees 33 minutes north of the United States of America, and latitudes 41 degrees 35 minutes 20 seconds north and 38 degrees 45 minutes south of the Eastern Pacific.

AUSPICES

The contest shall be conducted by the Aero Club of America, through its official affiliation and representative the Pacific Aero Club, and shall comply with the rules and regulations of the Fédération Aéronautique Internationale.

TIME LIMIT

The contest shall be confined between the months of September, 1919, and February, 1920, inclusive, and contestants must complete the trans-Pacific flight within two hundred and eighty-eight (288) hours from the time of starting.

AWARDS

In the event that no contestant shall successfully complete a trans-Pacific flight, for which the sum of fifty thousand (\$50,000) dollars is offered, the contestant starting from the Thomas H. Ince Aviation Field at Venice, California, or the Thomas H. Ince Hydroaeroplane Station at Venice, California, who shall have reached the Hawaiian Islands in the shortest length of time, shall be awarded the sum of ten thousand (\$10,000) dollars, and in the event that no contestant shall complete a flight to the Hawaiian Islands, the contestant starting from the two above-mentioned places who shall fly the furthest in the direction of the Hawaiian Islands shall be awarded the sum of five thousand (\$5,000) dollars.

QUALIFICATION OF CONTESTANTS

The contest is open to persons of any nationality holding an aviator's pilot licence issued by an accredited aero club affiliated with the Fédération Aéronautique Internationale, or to persons who have been so rated by any military or naval establishment.

ENTRIES

The entry form, which must be accompanied by the entrance fee of \$500, must be sent to the secretary of the Pacific Aero Club, Monadock Building, San Francisco, California, at least fourteen days before the entrant makes his first attempt. No entrance fee will be required of any military or naval entrant. Foreign entries will make application to the clubs in their respective countries which are affiliated with the Fédération Aéronautique Internationale.

Great Britain to Australia Flight

The following are the entries for the £10,000 Prize offered by the Australian Government for a flight from Great Britain to Australia :—

Pilot and Navigator	Crew	Machine	Engine
Capt. Cedric Ernest Howell, D.S.O., M.C., D.F.C.	Henry Fraser (Mechanic)	Martinsyde	275 h.p. Rolls-Royce Falcon
Capt. George Campbell Matthews	Sergeant Tom Kay (Mechanic)	Sopwith	350 h.p. Rolls-Royce Eagle 8
Capt. Ross Macpherson Smith..	Lieut. Keith M. Smith, R.A.F. (2nd Pilot)	Vickers-Vimy	Two 350 h.p. Rolls-Royce Eagle 8
<i>Pilot</i>	Sergeant J. M. Bennett		
Lieut. Valdemar Rendle.. ..	Sergeant W. H. Shiers (Mechanic)		
	Lieut. D. R. Williams (2nd Pilot) ..	Blackburn Kangaroo	Two 250 h.p. Rolls-Royce Twin Falcon
	Capt. G. H. Wilkins (Navigator)		
	Lieut. G. H. Potts (Engineer)		
Lieut. Roger Douglas, M.C., D.C.M., A.F.C.	Lieut. J. S. L. Ross, A.F.C. (Navi- gator)	Alliance	450 h.p. Napier "Lion"

propelled, of any size and type. Said flight may be attempted from either side of the ocean, but if westward the starting place must be from the Thomas H. Ince Aviation Field at Venice, California, or the Thomas H. Ince Hydro-aeroplane Station at Venice, California, and the finish must be on the mainland of Australia, or the mainland of the Japanese group of islands, or the mainland of the Philippine group of islands or the continent of Asia; if eastward, the starting place must be the mainland of Australia or the mainland of the Japanese

Presentation to the Club

The following book has been presented to the Club by Major C. C. Turner :—

"The Struggle in the Air, 1914-1918," by Major C. C. Turner. (Published by Edward Arnold.)

Offices: THE ROYAL AERO CLUB,

3, CLIFFORD STREET, LONDON, W. 1.

H. E. PERRIN, Secretary.

Midshipmen and the R.A.F.

IN view of the number of junior naval officers who will be surplus to the requirements of a post-war Navy, arrangements have been made by the Admiralty with the Air Ministry for a limited number to be transferred to the R.A.F. These officers must have passed through Osborne and Dartmouth, and must be over the age of 18½ years and under the age of 20 on February 1 next. They will be admitted to the R.A.F.

College without examination and without being called upon to pay fees, apart from the cost of books and instruments.

Certain medical examinations will have to be passed and those who become cadets at the Air Force College will be required to undergo instruction there for only one year, instead of the two years required of ordinary cadets, and they will receive pay at the rate of 10s. a day.

SOME FRIEDRICHSHAFEN "MILESTONES"

(Concluded from page 1374)

"The F.F. 43"

"This machine, which is shown in Figs. 24 and 25, was a single-seater fighter, very easy on the controls and quite fast and with a good climb. It also started from and alighted on the sea very easily. By way of armament it was fitted with one, sometimes two, fixed machine-guns. A characteristic feature of this type was that the pilot sat with his eyes on a level with the rear spar of the top plane, so that he could easily look either over or under the plane, which was a great advantage for fighting in the air.

"The F.F. 44"

(Fig. 26) was an experimental machine, fitted with a 240 h.p. Maybach engine, driving the screw through reduction gearing."

"The F.F. 48"

"This machine was designed as a two-seater fighter and was fitted with a 240 h.p. Maybach engine with direct drive (Fig. 27). The machine was very fast, had an extraordinarily good climb, and yet was very seaworthy. In spite of the heavy motor and the great quantity of fuel (sufficient for 5½ hours) the F.F. 48 was very handy. With the rear machine gun it was possible to fire over the top plane and between the propeller tips and the inner pair of interplane struts. The fixed machine gun was built-in to the right of the engine and was worked by the pilot.

"The F.F. 49C"

represented a considerable improvement on the type F.F. 39. It is shown in Figs. 28 to 30. The main data relating to it are:—Weight empty and without water, 3,260 lbs.; load, 1,430 lbs.; total weight, 4,690 lbs.; length o.a., 38 ft. 2 in.; span, 55 ft. 6 in.; float volume, 80 cub. ft.; speed, 80-87 m.p.h.; taking-off speed, 50 m.p.h.; climb to 6,600 ft. in 30 minutes; duration, 5½ hours.

"This machine gives a very robust impression and is at first sight even somewhat clumsy. There is nothing "streamlined" or light about it, but everything is heavy and strong. It is clearly seen that in the construction of this machine not only the aerodynamical expert but also the sailor has had a say. The object which the constructor had to attain was to produce an aircraft which, with a 220 h.p. engine and a load of about 1,430 lbs., should have the greatest possible seaworthiness, and an experience extending over more than two years has shown that this object has been attained in a most complete manner.

"By seaworthiness is understood the capabilities of the seaplane to start, land and taxi under certain conditions of wind and sea with full load, and piloted by an average pilot. As, in spite of the fact that the designer chiefly aimed at seaworthiness—the machine had a very good performance—it shows how thoroughly the construction has been thought out. A speed of 87 m.p.h. and a climb of 6,600 ft. in 25 to 30 minutes must be considered exceptionally good for a seaplane; especially is the latter satisfactory in view of the fact that seaplanes are usually flown at fairly low altitudes. In the air the machine is very comfortable and easy to fly. The manoeuvrability is extraordinarily good, considering that the machine weighs over 2 tons and has a span of 55 ft. 6 ins.

"As already mentioned the machine had an opportunity of proving itself during the latter part of the war. It might be further pointed out that on several occasions the crews of other seaplanes have been rescued with this type, and that even with the extra load of the rescued crew the machine has started from a fairly rough sea. Or another example: A machine of this type has floated about in a high sea for seven days at the end of which time the crew—which long ago had been given up as lost—were rescued. The F.F. 49C was also used as a reconnaissance machine with one movable machine gun and wireless apparatus.

"The F.F. 49B"

was used purely as a bomber (Fig. 31). In general dimensions and design, the 49B is similar to the F.F. 49C, but in the 49B the pilot occupies the rear seat, while the observer sits in front with the telescopic bomb sights.

"The F.F. 59B"

"As a result of the requirements for reconnaissance machines to be capable of defending themselves against attack, and even under suitable conditions to go over to attack, the F.F. 59C shown in Figs. 32 and 33 was so designed that with the rear machine gun the gunner could fire forward between the first pair of interplane struts and the propeller disc, whilst the fixed machine gun was worked by the pilot.

In order to give as large a field of fire as possible to the rear machine gun, the inner front interplane strut was moved outwards slightly farther than the corresponding rear strut, and the wing bracing of the inner bay was entirely omitted.

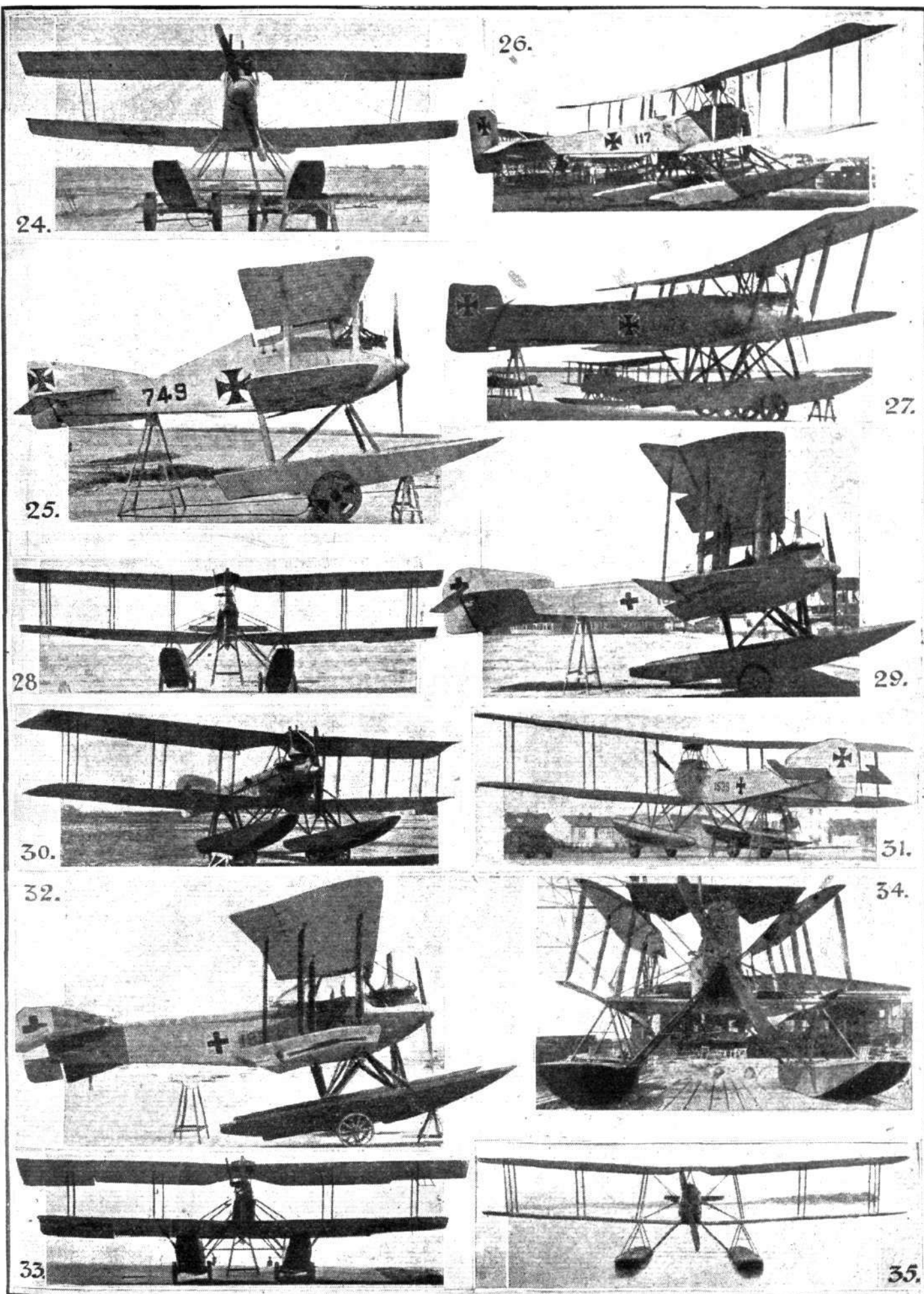
"The F.F. 64"

"The success of the 'Wolfchen' as a ship's 'plane to the auxiliary cruiser 'The Wolf,' led to the construction of the F.F. 64 (Figs. 34 and 35). This machine, which had a 160 h.p. Mercedes engines, has been specially designed to be easily launched from the ship. In order to facilitate storage and launching, the wings are made to fold back, the hinges being just above the floats. The machine can also be easily dismantled and erected without its rigidity, reliability and seaworthiness being impaired.

"As a result of the very extensive experience of seaplane construction for War purposes, the Friedrichshafen aircraft works on Lake Constance and its branch factory at Warne-münde are in a position to, and are making every effort to, take up the construction of seaplanes for commercial purposes. As the firm has up till now chiefly devoted its energies to the construction of seaworthy seaplanes, it will be seen that it is in a better position than many other firms to construct seaworthy commercial and sporting seaplanes of all types. Especially suitable for this purpose would be the types which have proved themselves during the war, such as F.F. 49C, 33J(S), 33L, 41A, and 64. The type F.F. 49C is, it will be seen from the particulars given above, especially suitable for commercial work. The useful load of 1,430 lbs. may be divided up in different ways, according to the purpose for which the machine is intended, between crew, fuel, passengers and mail. For instance, with sufficient fuel for 3½ hours over 600 lbs. of useful load could be carried. For passenger carrying it would be easy to provide seating accommodation, either open or closed, enabling the machine to carry two or possibly three passengers in addition to the pilot.

"Seaworthiness means safety. Safety is one of the chief considerations for a commercial aeroplane. Since the seaworthiness of this type has never, in spite of the greatest efforts, been beaten by the machines of any other firm, it would appear that also in post-war competition it will be one of the most suitable types and difficult to beat. Much the same may be said about the lower-powered machines F.F. 33J, F.F. 33S and F.F. 64. Especially would the latter machine offer great advantages for commercial work to ship-owners for carrying on board as a ship's 'plane. For instance, it would be possible without going into port, or in other words without any appreciable loss of time, to put ashore or to take on board single passengers or mail. Or, before arriving at the port of destination an officer could be sent ashore in the machine with the ship's papers, thus not only saving time but possibly also making a considerable profit on goods carried through being first in. Also the passenger who is in a hurry can be sent on ahead in the machine, thus shortening his time of crossing by as much as 10 hours. On the other hand, the machine can fetch mail from ashore so that the mail can be on board the ship several hours before she reaches port. The machine can be employed to assist in navigation on approaching the coast in bad weather, and it can also be utilised for flying ahead of the ship, spotting for floating mines. In case of accident it may possibly be used for obtaining assistance quickly. Also from the land, the machine can be used with advantage. For instance, a merchant could be flown out to meet the incoming ship, which is carrying an agent, so that all the business could be transacted by the time the ship arrived in port, thus beating the competitors who have remained ashore. For use by salvage companies it would be possible to use the seaplane for taking an engineer to the place of the stranding in the shortest possible time, where he could photograph the stranded ship and even, if the sea is not too rough, alight and go on board the wrecked ship, so that the salvage contract could be completed before a competitor could arrive by steamer in the ordinary way. F.F. 33L is very suitable for practice flying for young pilots, and would make a good sporting machine. It is light and very comfortable to fly and requires little storage space, while being easy to dismantle and erect. All of which are qualities that make it specially suitable as a sporting machine for the private owner.

"If it is a question of carrying relatively great loads at lower speeds, a machine similar to the type F.F. 41A or to the type F.F. 53, with two 260 h.p. Mercedes engines, would be suitable."



THE FRIEDRICHSHAFEN SEAPLANES : Figs. 24 to 35

THE AUSTRALIAN GOVERNMENT FLIGHT COMPETITION

IN spite of the great difficulties attending a flight to Australia at the present time, four machines have been entered for the Australian Government's prize of £10,000 for a flight in 30 days from Britain to Australia, a distance of 11,500 miles, and the pilots have notified their intention to start shortly. The successful completion of the flight will establish a new link in the chain of Empire, which has already been forged by the recent Transatlantic flights and the trips to Egypt and India.

The names of the pilots and crews and details of the machines entered are given on p. 1393.

Captain Matthews Starts

As recorded in the Official Notices of the Royal Aero Club on p. 1392, Capt. G. C. Matthews and Sergt. Kay, both of the Australian Flying Corps, left Hounslow at 11.45 a.m. on Tuesday on the first stage of their 13,000-mile flight to Australia.

The machine—fully described in the last issue of *FLIGHT*—on which Capt. Matthews is attempting to reach Australia is a Sopwith Wallaby fitted with a single 375 h.p. Rolls-Royce engine.

Among a small number of postal packets taken is a letter from the King to the Governor-General of Australia.

The Air Ministry announces that the following messages have been transmitted to Capt. Matthews:—

FROM PRINCE ALBERT.—May good fortune attend you in your sporting flight.

FROM MAJ.-GEN. SEELY (Under-Secretary of State for Air).—I wish you the best of luck in your sporting attempt to fly to Australia.

FROM MAJ.-GEN. SIR F. H. SYKES (Controller-General of Civil Aviation).—Success to your effort.

The route to be followed is:—Paris, Lyons, Rome, Naples, Brindisi, Sicily, Aboukir, Kantara, Damascus, Baghdad, Basra, Karachi, Delhi, Calcutta, Rangoon, Penang, Singapore, Bandoeng, Agamboea, and Port Darwin.

The Arrangements.

With the existing facilities for refuelling and landing in emergency, especially at the eastern end of the route between Indian and Australia, this journey is a most rigorous test of physical and mechanical endurance, as may be judged from the fact that in the case of aeroplanes the last lap of the course, 1,750 miles from Bandoeng (Java) to Port Darwin (North Australia), coming as it does after some 10,000 miles of flying, is in itself comparable in severity with the flight by aeroplane across the Atlantic.

Every assistance possible has been given by the Air Ministry, in conjunction with the Royal Aero Club and the Commonwealth Government, towards lessening the risk to competitors. Among the duties undertaken by the Air Ministry have been arrangements for the supply of fuel and the use of R.A.F. personnel, where available, at stopping places, a survey of the route between Calcutta and Australia, and an investigation of the many problems of meteorology, navigation and wireless and cable communications; all factors essential to success.

The competition was initiated by the Australian Government in March last, but the flight did not take place earlier partly because the International Air Convention, permitting flying over foreign countries, was not signed until September 10, and partly because no ground organisation (including necessary supplies) existed East of Delhi, and no survey had ever been undertaken. The Air Ministry had previously decided to carry out a survey of this section across Burma, the Malay Peninsula and the Dutch East Indies, and Brig.-Gen. A. E. Borton, D.S.O., and Capt. Ross-Smith had been despatched to carry out the work as speedily as possible.

On his return, Gen. Borton reported that the construction of aerodromes at distances of approximately 400 miles apart over this section was highly desirable, but if this plan was to be carried out before flying was permitted, no flights would take place this year and the favourable weather which prevails generally along the route during November, would have passed.

Therefore, although the competitors have been warned that the route is largely unready they have chosen to make an attempt at once; recognising and accepting gallantly the risks attending the long flights over this region of rugged volcanic islands, jungle and swamps. But while the ground organisation is still imperfect, arrangements have been made for the race courses at Rangoon and Singapore to be used as

landing grounds, and the Netherlands Government has consented willingly to place its aerodrome at Bandoeng (Java) at the disposal of competitors. Even by following this route, however, aeroplanes will have great distances to fly between each landing station, especially between Bandoeng and Port Darwin. In view of this, the Air Ministry has suggested that it would be advisable for competitors to convert their aeroplanes into seaplanes by the substitution of floats for wheels at Calcutta or another suitable point, so that the machines would be able to use the many available harbours and sheltered inlets along the route.

The route which the Air Ministry has advised competitors to follow between England and Australia is summarised hereafter, but the Royal Aero Club does not compel them to adhere to it except that they must stop at Singapore, which is the only control station under the rules of the contest.

The first section which passes over France, Italy, and Malta to the North Coast of Africa and to Egypt at Aboukir, was the route followed by Brig.-Gen. MacEwan and Major Maclaren some months back. The aerodrome at Suda Bay (Crete) is, unfortunately, reported flooded—which prevents that route being taken.

From Aboukir to Karachi the route follows that explored by Gen. Salmond a year ago, by way of Damascus, Baghdad, Basra, and the coasts of Persia and Baluchistan. More than one flight has been made over this section, but it cannot be regarded as fully organised, and special arrangements have had to be made by the Air Ministry for the preparation of landing grounds and the supply of fuel. The landing grounds available are generally good and landing on the desert is usually practicable in emergency, but the possible unfriendliness of the inhabitants, not less than the shortage of water and the absence of means of communication, add to the risks of a forced landing.

On leaving Karachi, the next stage lies across India to Calcutta via Nasirabad, Delhi and Allahabad, and the Indian Government has promised all possible assistance from the Royal Air Force in India. No aerodrome exists in Calcutta, but the competitors will be able to land on the race-course.

Beyond Calcutta competitors are responsible for making their own arrangements for the necessary supplies of fuel, spares, etc., in view of the fact that no British Official aerodromes exist.

Some of the difficulties which competitors may expect on the Calcutta-Australia Section are indicated from the following notes. On the aeroplane route there is a landing ground at Akyab, 280 miles from Calcutta, but it is far from wise for a pilot to attempt to land there unless he has previously inspected the surface. No other landing ground is available for over 500 miles until Rangoon race-course is reached; here, also the pilot should know the ground.

There is another long stretch of more than 1,300 miles to Singapore where once more the only possible landing ground is the race-course. The authorities have kindly consented to do a certain amount of work which is required to clear these race-courses in order to fit them as landing grounds.

The next possible stopping place for aeroplanes is a Dutch Flying School at Bandoeng (Java), which the Dutch Government have kindly put at the disposal of the competitors.

This competition resembles others in that the hardest task is at the end. Between Bandoeng and Port Darwin, a distance of 1,750 miles, of which 500 miles are over the sea, there are no aerodromes of any description. Under these circumstances the successful accomplishment of this section of the flight alone will mark an epoch in the world of aviation, and will tend to advance still further the high standing of British aircraft firms.

Gen. Borton considers that at least three-quarters of the whole section between Calcutta and Australia, over Burma, Malay and the East Indies, offers but slight chance of a successful emergency landing in an aeroplane, and warns pilots against being deceived from the air; particularly against attempting a landing on the sea shore or on the paddy fields.

On the other hand, machines equipped with floats, have the advantage of being able to alight in many sheltered harbours between Calcutta and Port Darwin, and may stop at will for refuelling at Akyab, Rangoon, Mergui, Penang, Singapore, Banka, Batavia, Surabaya, Bima and Koepang Bay (Timor), the distance between each being comparatively short, no stage exceeding 500 miles.

Apart from the difficulties outlined, good weather will be an important factor to success, and one of the reasons why competitors have decided not to start until this month is the fact that, taken all round, the weather during the latter part of October and in November is reported to be better than at any other period of the year. Notwithstanding this, competitors may have to contend with adverse conditions on some sections of the route. The Air Ministry will assist pilots to obtain weather reports at different points on the journey.

Air Ministry Route for Competitors

The aerodromes or emergency landing grounds available are as follows: Places printed in SMALL CAPITAL letters are main stopping places; places where fuel and oil are available are marked with an asterisk. The distance in miles from London is shown in each case.

London to Aboukir (Egypt)

Miles.		Miles.	
	*HOUNSLOW.	1,624	SICILY.
	*LYMPNE.	1,742	*MALTA.
	*MARQUISE.	2,157	Ben Ghazi.
240	*PARIS (LE BOURGET).	2,475	*Sollum.
415	Beaune.	2,525	Sidi Barani.
603	*LYONS.	2,595	*MERSA MATRUH.
755	*MIRAMAS.	2,675	El Dabaa.
844	*ST. RAFAEL (OF FREJUS).	2,729	El Hamman.
1,050	*PISA (ST. GIULIANO).	2,755	*EL AMRIAHI.
1,225	*ROME (FORT BARACA).	2,827	*ABOUKIR.
1,340	*NAPLES (CAPODICHINO).		
1,424	*FOGGIA (SOUTH).		
1,562	*BRINDISI (OF TARANTO).		

(Further information received regarding the flooding of Suda Bay (Crete) on this section of the route indicates that it was available up to October 12th, but it cannot generally be relied upon for use after November 1.)



Poulet's Flight to Australia

As briefly recorded in our last issue, Poulet was able to make a start from Paris on the morning of October 14, and he succeeded in reaching Frejus. The next morning he set out for Rome, but was forced down by the bad weather at Pisedom, north of Rome, and had to wait until the following day to complete the stage to Rome. He started off on his Caudron, from the Centocelle aerodrome on October 18 for Salonika, but later in the day he arrived at Naples, where he was compelled to land on account of bad weather conditions prevailing.

The Deutsch Cup

In further trials for the Deutsch Cup on October 14 M. Rozt completed the course of 120 miles round Paris in 55 min., but as he did not improve on Jansen's speed of 200-655 kiloms. per hour by 10 per cent. he did not secure the trophy. M. Romanet also made a trial, but could not complete the course. In his first lap he is said to have averaged 268 kiloms. per hour. On the following day Sadi Lecointe, on a Spad, succeeded in doing the distance in 46 min. 7 sec., averaging 247-719 kiloms. per hour, and he therefore holds the cup for the time being.

Aboukir to Karachi.

2,933	*KANTARA.	3,742	*BAGHDAD.
	Hit.	4,047	*BASRA.
	Ramdieh.	3,253	*BUSHIRE.
		4,660	*BANDAR ABBAS.
		4,933	*CHARBAR.
		5,401	KARACHI.

(Damascus and Abu Kemel were originally included, but it is now stated that these two points will not now be available to competitors, who should, therefore, be prepared to carry out their flight without landing at these places. There is a landing ground, however, at Ramdiah (near Jerusalem) which may be used.)

Karachi to Calcutta

5,375	Nasirabad.	6,375	Fateh Pur.
6,093	Delhi.	6,375	*ALLAHABAD.
6,325	Cawnpore.	6,985	CALCUTTA (FORT WILLIAM).

Calcutta to Port Darwin

The routes proposed for aeroplanes and seaplanes are shown separately. (Favourable alighting conditions for seaplanes are to be found at any of the places mentioned. Fuel supplies are known to exist at the places marked with an asterisk. The competitors have arranged with the Shell Marketing Company to provide petrol on this section.)

Miles.	Aeroplanes.	Miles.	Seaplanes.
7,688	RANGOON.	8,046	MERGUI.
9,011	*SINGAPORE.	8,576	*PENANG.
9,549	*BANDOENG (Java).	9,011	*SINGAPORE.
11,294	PORT DARWIN.	9,242	BANKA.
		9,549	*BATAVIA.
		9,987	SURABAYA.
		10,419	BIMA.
		10,776	KOEPANG BAY.
		11,294	PORT DARWIN.

Miles.	Seaplanes.
7,342	AKYAB (Burmah).
7,688	RANGOON.

British Machines for Chile

CHILE is looking towards Great Britain for her aviation supplies, and her Aerial Forces Department has decided in favour of accepting the offer of a British house to establish works for the construction of aeroplanes in Chile.

A Club for Canadian Flyers

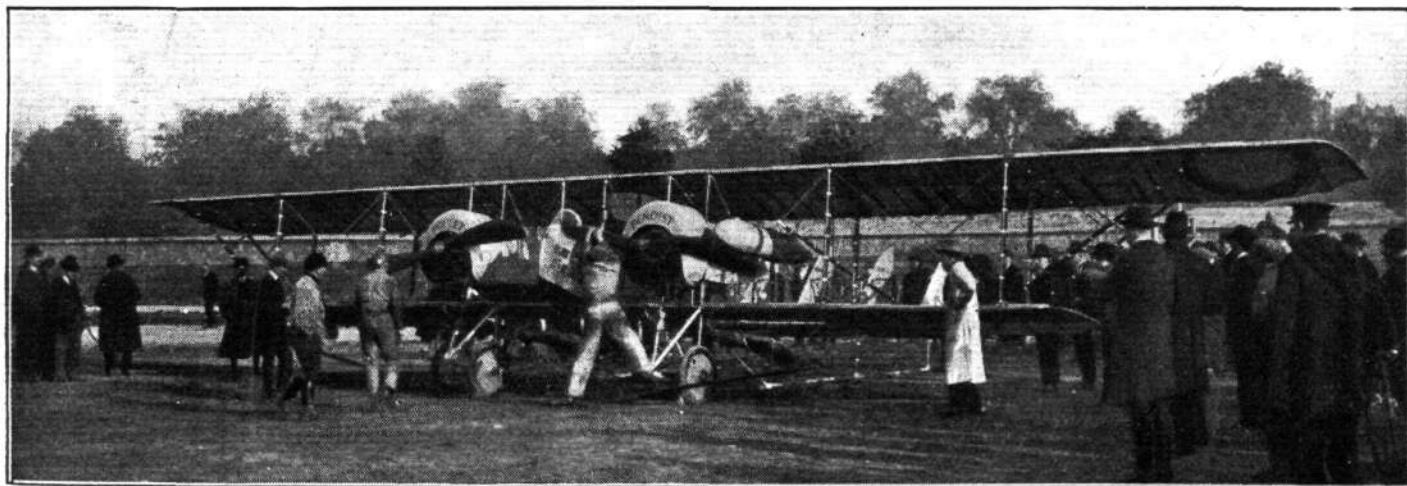
CANADIAN flying officers who have seen overseas service have organised a club, and hope eventually to organise and own an aerodrome, together with a number of machines. It is also proposed that the club should make entries for international flying competitions.

To Link-Up Ireland by Air

A START may shortly be made with the organisation of a regular aerial service between England and Ireland, as permission has been granted to a Blackpool firm to use Merrion Stand, a huge expanse of seashore near Dublin, for landing and taking up passengers in connection with an aerial service which is to link up the principal cities and towns of Ireland.

The New Farman "David"

A NEW small two-seater machine, fitted with a 40 h.p. engine, is now being constructed in the Farman works. Its first trial flight will be a trip from Paris to Casablanca, probably carrying a passenger.



M. Etienne Poulet starting from Paris on October 14 for his attempt to fly to Melbourne. Starting the props. of the twin-engined Caudron

THE ALTITUDE LABORATORY FOR THE TESTING OF AIRCRAFT ENGINES

BY H. C. DICKINSON AND H. G. BOUTELL

(Concluded from page 1380)

The Air Cooling Systems

THE air cooling system may be divided into three parts—the refrigerating plant, the cooling system for the carburettor air, and the cooling system for the interior of the altitude chamber.

The refrigerating plant is installed in the left hand portion of the building, as seen in Figs. 1 and 11. The ammonia compressor is a 9 by 9 in., double cylinder, vertical, enclosed machine, with a refrigerating capacity of 25 tons in 24 hours, and was built by the York Manufacturing Co., York, Pa. It is belt-driven from a 50 h.p. electric motor. The plant operates on the direct-expansion system, the ammonia condenser being placed against the outside of the west wall of the building, with the ammonia receiver along the north wall, back of the compressor.

The cooling system for the carburettor air consists of a bank of ammonia coils mounted on top of the altitude chamber. The coils are made up of 2,000 ft. of $1\frac{1}{4}$ -in. pipe, enclosed in a box and insulated with 4 ins. of sawdust. The air is made to pass through this box in a tortuous path, and is then led through an insulated pipe provided with a set of electric heating grids and a regulating valve to the test-chamber through opening 18. From this inlet it passes through the air meter to the carburettor. In this way warm or cold air may be supplied to the intake as required.

The system for cooling the air within the chamber is made up of a bank of 800 ft. of $1\frac{1}{4}$ -in. ammonia coils, placed in the left hand portion of the altitude chamber, as shown in Figs. 1 and 3. Four motor-driven fans are provided to force the air over these coils, while another fan is installed to circulate the air past the engine itself when desired.

By means of the refrigerating plant and cooling system just described, it is possible to reduce the temperature of the air admitted to the carburettor and that within the test-chamber to a point approximating the temperature at any altitude up to about 30,000 to 40,000 ft., depending upon the size of the engine. Owing to the fact that the temperature cannot be readily controlled by means of the refrigerating plant, the air, after cooling and before admission to the carburettor, is passed over a series of electric grids, by means of which the temperature may be again raised and kept at any desired point. The current flowing through these grids is controlled by conveniently placed switches. Some difficulty has been experienced due to the condensation of moisture which occasionally causes a "snow storm" in the air passage

to the carburettor. It is hoped that this difficulty will be entirely overcome in the new laboratory, through the elimination of leaks into the refrigerating chamber and the use of what may be termed a "settling chamber," through which the air will pass after being cooled, and in which the air flow will be so sluggish that the snow will be deposited.

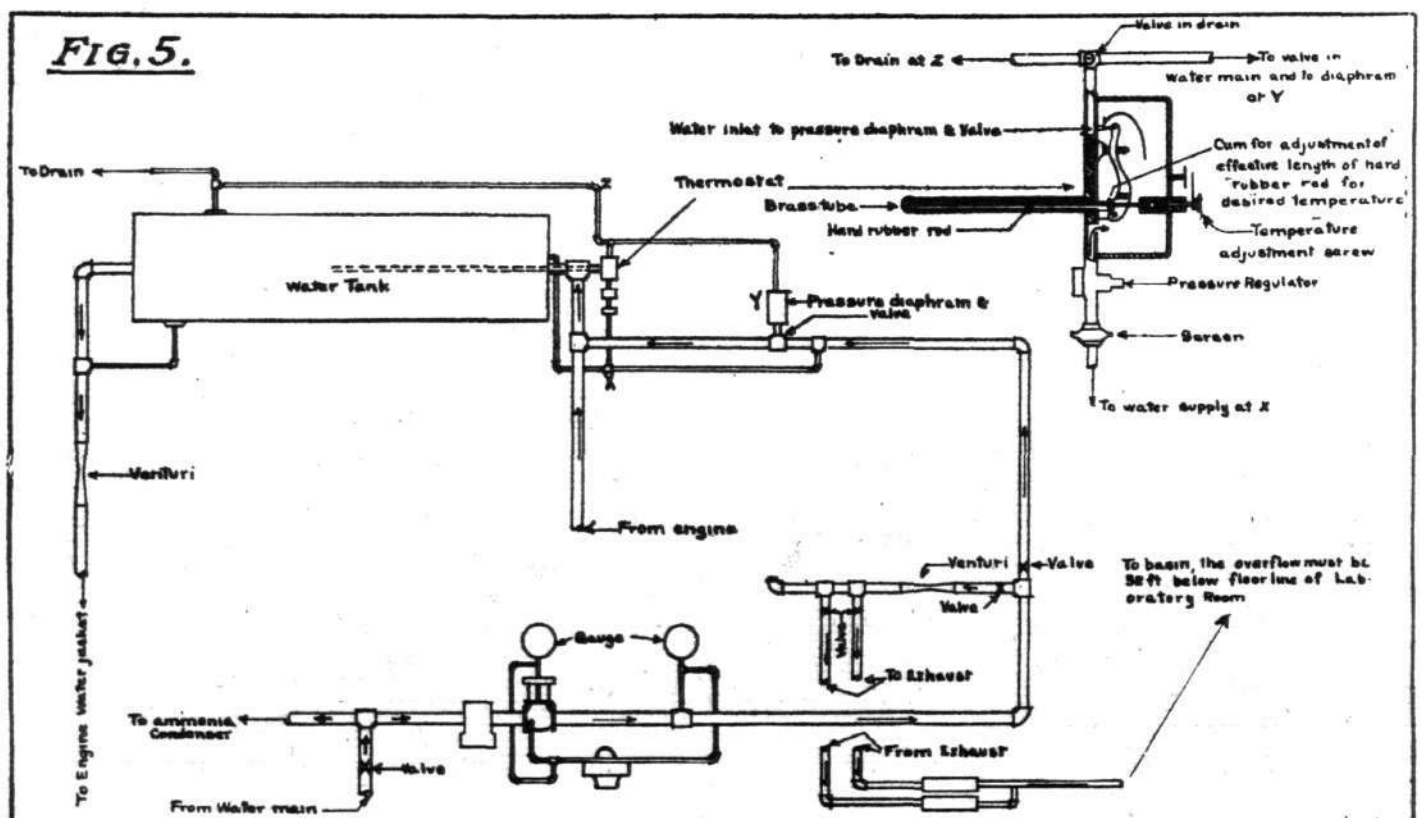
The Jacket Circulating Water Cooling System

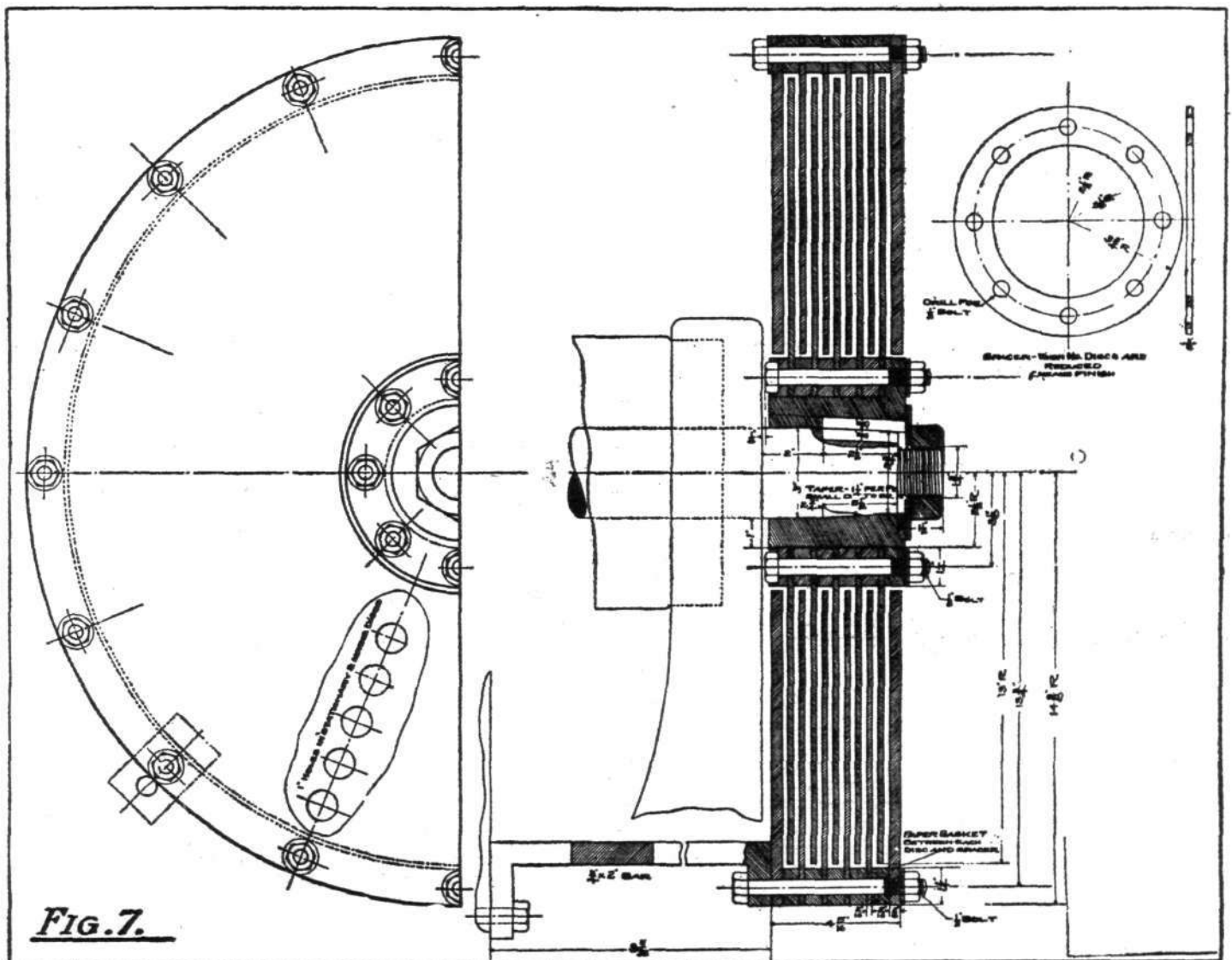
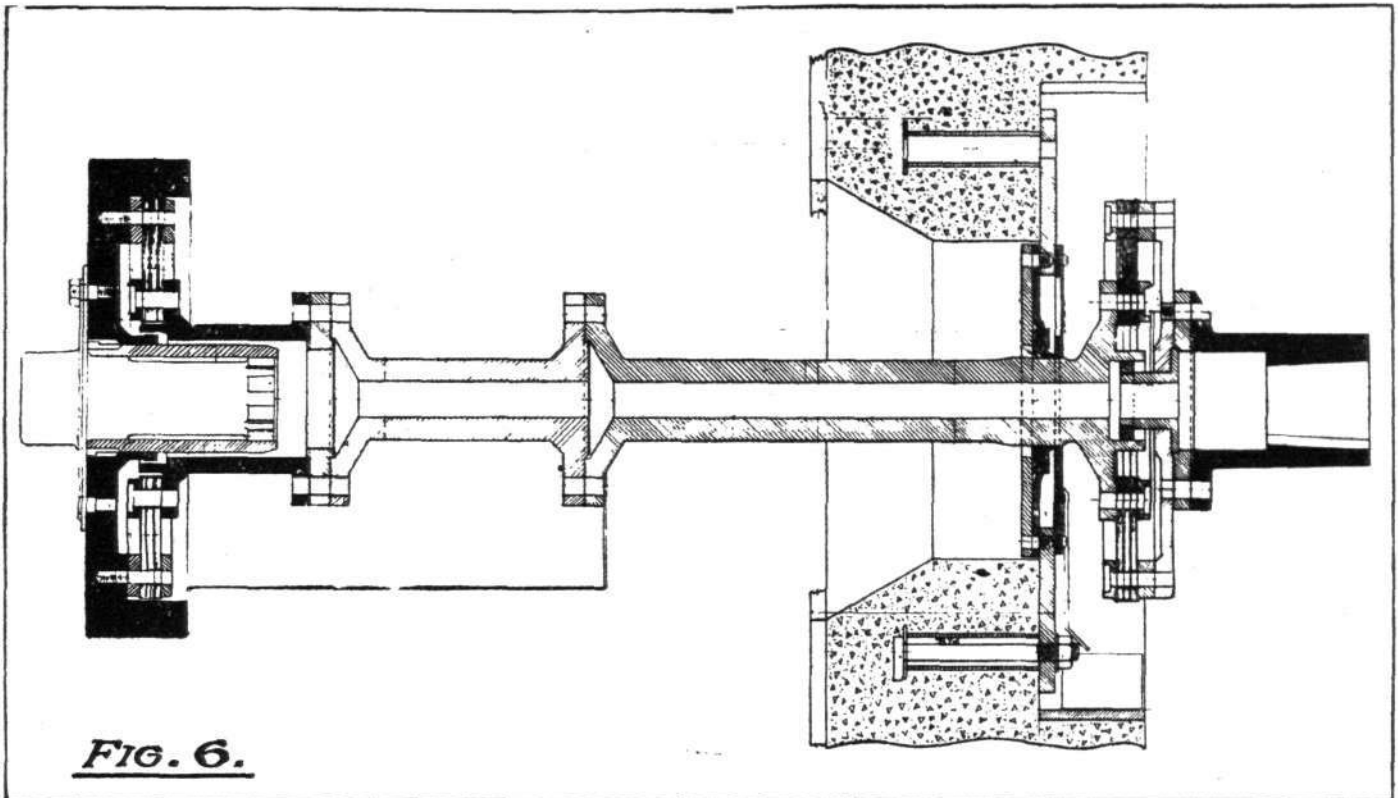
The jacket water cooling system is arranged as follows:—Above the altitude chamber is placed a cylindrical iron tank connected to the inlet and outlet pipes of the engine's circulating system, and with another pipe from the city mains, while an overflow leads to the sewer. A thermostat is placed within the tank, the brass rod of this device controlling a pilot valve which admits or discharges city water from a bellows, which in turn, controls the main valve on the city supply pipe. In case the temperature of the water in the tank rises above a certain point, the expansion of the thermostat rod causes the pilot valve to open, admitting water to the bellows, and thus allowing cold water from the city supply mains to flow into the tank. When the temperature has again fallen, the contraction of the thermostat rod closes the pilot valve and allows the water to escape slowly from the bellows. Two-coil springs then close the main valve, cutting off the supply.

The thermostat is mounted in the fitting through which the water enters the tank from the engine jackets, and also from the city mains. It is, therefore, very sensitive to slight changes in temperature; a very important matter in a laboratory of this sort, since even a comparatively slight variation in the temperature of the circulating water affects the heat distribution in the entire engine. In practice it has been found possible to hold the temperature of the jacket water to a variation of about 5°C .

The Exhaust Cooling System

The exhaust cooling system is shown diagrammatically in Figs. 3 and 5. The exhaust pipes connected to the engine are water-jacketed, the inner pipe extending down about 3 ft. from the exhaust port, while the outer pipe or jacket is continued from the exhaust port to the main exhaust manifold in the form of a flexible tube. In this way the whole connection is flexible. This arrangement is clearly shown in Fig. 9. The water from the annular space mixes with the exhaust gases only at a point a considerable distance from the engine. The water enters the altitude chamber through







The electric dynamometer is mounted on a concrete foundation at the right of the altitude chamber, as shown in Fig. 1. It was built by the Sprague Works of the General Electric Co., and has a rated capacity of 300 h.p., though it is capable of caring for considerable overloads. The dynamometer consists essentially of a direct current generator, the field ring of which is free to rotate with the armature, except as this rotation is opposed by a connection to a scale beam, which, therefore, measures the torque delivered to the machine. An auxiliary spring balance is also used, interposed between the torque arm of the dynamometer and the scale beam, which serves as a handy means for measuring the approximate torque. Current from the dynamometer is controlled from a switch-board placed near by, and may either be dissipated in grids placed outside the building, or may be returned to the regular power lines of the Bureau. The dynamometer with its scale beam is shown in Fig. 10.

An unique feature of this brake, made possible by the fact that it is integral with the electric dynamometer, which cares for the adjustments of load, is that it can be operated



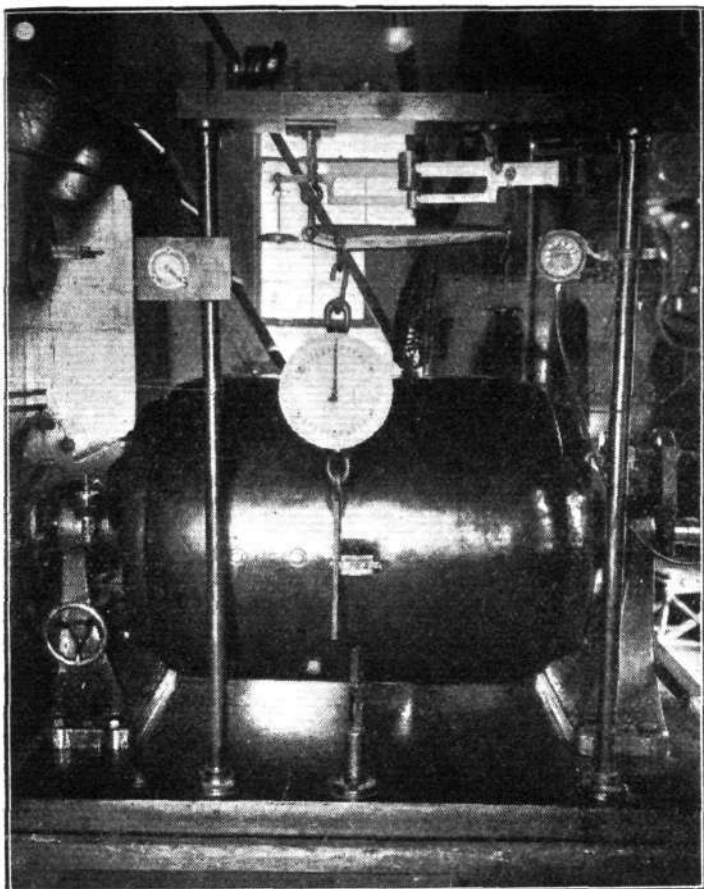


Fig. 10.—Electric dynamometer

at any one of four fixed water levels corresponding to four oblong outlets in the casing. When any one of these outlets is opened, and the rate of water flow is approximately adjusted, a constant water level is maintained, which is reasonably independent of small variations in supply pressure. Operated in this way, the water brake is quite satisfactory, being free from the tendency to "drift" towards higher or lower loads with small changes in water pressure.

The Gauge Boards and Engine Controls

The copper tubes for the manometers and the engine control cables are all carried to two boards, mounted at the front right-hand corner of the altitude chamber as shown in Fig. 13, and so arranged that one man can control the entire plant, and at the same time conveniently see all the measuring instruments. In this way the whole plant is under the observation and direction of the chief operator at all times.

The spark and throttle levers work in graduated quadrants, which indicate the exact positions of the levers on the engine. The number of these control levers may be varied to suit the number of attachments provided with any particular carburettor.

The instruments mounted on the gauge board are as follows:—

- (1) Venturi gauge for carburettor inlet air.
- (2) Barometer and thermometer.
- (3) Manometer for carburettor float-chamber pressure.
- (4) Manometer for exhaust back pressure.
- (5) Auxiliary barometer.
- (6) Manometer showing average pressure in exhaust manifold.
- (7) Manometer showing the pressure difference between the entrance to the carburettor air venturi and chamber.
- (8) Venturi gauge for jacket water.
- (9) Venturi gauge for exhaust cooling water.
- (10) Venturi gauge for oil cooling water.
- (11) Indicator showing fluctuations of chamber pressure from that desired.
- (12) Manometer showing average pressure in inlet manifold above carburettor choke.
- (13) Manometer showing difference in pressure between entrance to carburettor and chamber.

(14) Manometer showing carburettor choke pressure.

(15) Manometer indicating the pressure difference between the exhaust port and the chamber.

(16) Venturi gauge on gasoline supply line.

Besides the above, there are the regular gauges and indicators supplied with the particular type of engine under test, which in the case of the "Liberty 12" include:—

1. Vapour thermometer giving jacket inlet water temperature.
2. Vapour thermometer giving jacket outlet water temperature.
3. Vapour thermometer giving oil inlet temperature.
4. Vapour thermometer giving oil outlet temperature.
5. Oil pressure gauge.
6. Combined starting switch and ammeter for Delco-ignition system.

A revolution counter, provided with a magnetic, as well as a hand clutch, is attached to the dynamometer shaft.

Measurement of Air Flow to Carburettor

Two means have been used to measure the amount of air flowing to the carburettor: a Thomas meter, and a venturi tube.

The Thomas meter used was specially built for the altitude laboratory, and consisted of a wooden box 6 ins. square on the inside and 16 ins. long, which contained a heating grid between two sets of thermocouples. The principle of operation was simply that a given energy put into the heating grid would cause a rise in temperature (measured by the thermocouples) inversely proportional to the mass flow of air.

The heating unit was merely a length of resistance wire strung back and forth across the middle of the box. In practice an E.M.F. of 60 volts was impressed on it, giving current of 2.9 ampères. The thermal element consisted of 20 copper-constantan couples in series, four junctions being encased in each of five streamlined struts placed in each end of the box. The four couples were equally spaced down the length of the strut, so that the result of all the couples gave an average for the temperature rise over the whole cross-section.

This meter was eventually destroyed in a small fire in the altitude chamber, and was then replaced by a large 6-in. venturi with a 3-in. throat. The venturi, however, was calibrated against a second Thomas meter specially supplied by the Cutler Hammer Co. This meter used resistance thermometers in place of the thermocouples, and measured the watts input for a constant temperature rise. The connections from the venturi meter are carried to the manometer board.

Temperature Measurements

The following temperature measurements are made by means of thermocouples:—

- (1) Temperature rise oil cooling water.
- (2) Carburettor air at entrance to venturi meter.

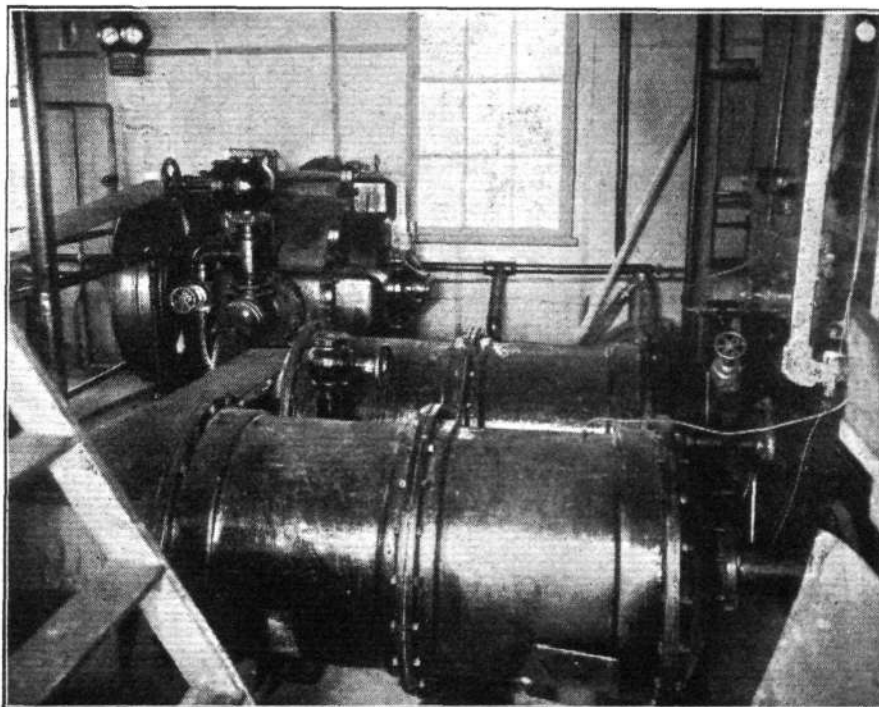


Fig. 11.—Exhaust tanks and vacuum pump

- (3) Rise in jacket water temperature.
- (4) Jacket water outlet.
- (5) Exhaust cooling water inlet.
- (6) Rise in exhaust water temperature.
- (7) Chamber temperature.
- (8) Oil temperature at engine inlet.
- (9) Oil temperature at engine outlet.
- (10) Carburettor air, taken at the air horn.
- (11) Inlet manifold temperature.
- (12) Gasoline temperature.

The leads from the thermocouples pass through opening 5 (see Fig. 2) in the side wall of the altitude chamber to a table on which are mounted the necessary switches and potentiometer, as shown in Fig. 12. The galvanometer is swung in a special cradle mounted on a solid concrete pier to eliminate so far as possible the effects of vibration. Considerable difficulty was experienced in the early operation of the plant owing to the lack of a proper support for the galvanometer. The vibrations from the engines are transmitted through the ground, so that even the concrete pier was not sufficiently steady, but the present arrangement has done away with this trouble to a large extent.

The thermocouples are all copper-constantan couples, the junctions being made by twisting the ends of the wires together and soldering with silver solder. The present couples are: an ice junction common to three junctions placed in the oil pipes, an ice junction common to seven junctions used about

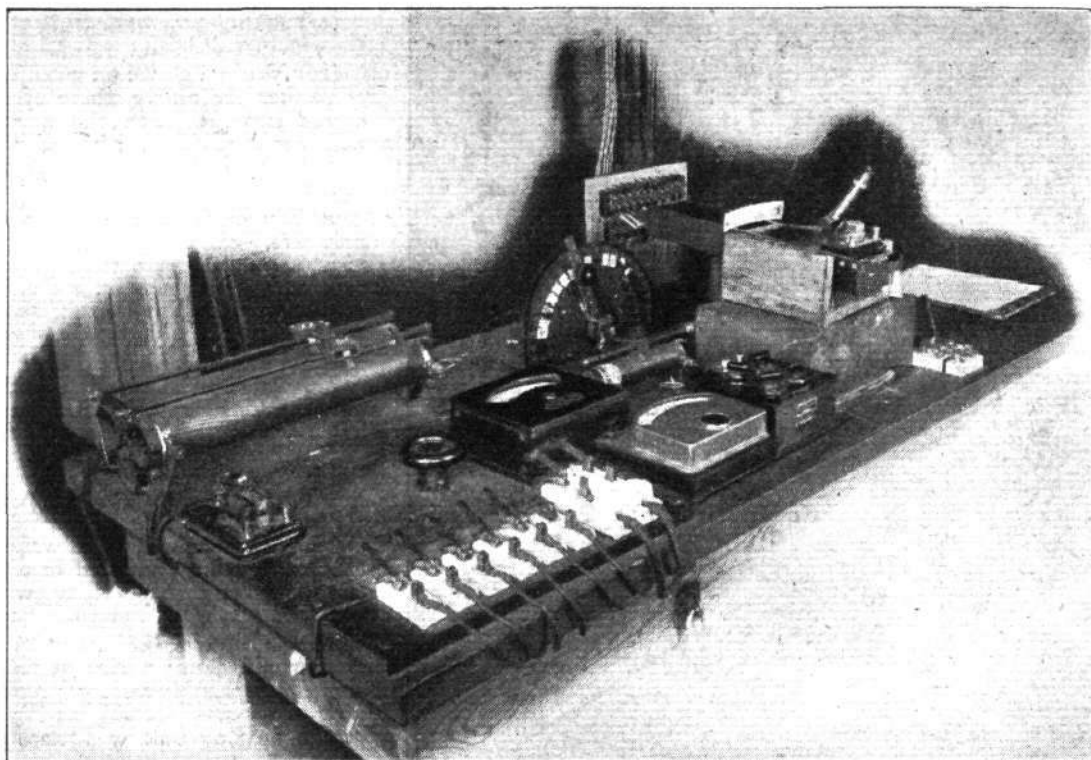


Fig. 12.—Thermocouple and air temperature central switches

the carburettor and as spares, an ice junction and a junction suspended in the chamber to measure the room temperature, an ice junction and one junction inserted in the carburettor air line above the venturi, an ice junction and two junctions placed in the outlet and inlet jacket water pipes, and outside the chamber, a circuit of three junctions, one in the water main, and two in the exhaust tanks.

All couple wires are wrapped with tape for insulation and to prevent rubbing and to give them body. They are connected with rosin-soldered joints to copper leads passing through the wall of the chamber and brought out to a dial switch with all copper contacts. Before being fastened to the switch, each couple has a small coil of manganin wire connected in series and adjusted to give it an equal resistance to all other couples. The switch has a rotating arm which carries two copper spring contacts which bear in turn upon the copper contacts to which the couples are attached.

From the arm the circuit is completed through a carefully-made manganin resistance of 0.029 ohms, a manganin dial resistance box adjustable in steps of 0.1 ohm to 1,000 ohms, a galvanometer and a key. The 0.029 ohm resistance forms part of a potentiometer circuit consisting of a dry cell, a milliammeter, a double-throw switch and a slide wire rheostat. Another branch circuit is controlled by the closing of a double-pole switch, which serves to connect a carefully balanced pair of resistance coils of approximately 85 ohms each, and these together with the dry cell, galvanometer, resistance box, and thermal element, form a Wheatstone bridge.

The potentiometer affords a means of measuring the sensitivity of the galvanometer as follows: Across two terminals of the dial switch a coil is connected having the same resistance as the thermal elements, but without their thermo-electric property. The arm is placed on these terminals, and the sensitivity is then found by establishing a definite current through the potentiometer (50 milamps) and observing the galvanometer deflection. This has been found subject to variation on account of the heavy machinery in its neighbourhood, but can always be brought back to its original value by an adjustment of the resistance box.

The Wheatstone bridge serves to compare the resistance of the different couples up to the point of attachment to the dial switch, and is sensitive to 0.1 ohm, this being amply sensitive for the purpose.

Thus, from this set up, the E.M.F. of any thermocouple may be measured by the current it establishes through the galvanometer; and with the bridge and potentiometer the conditions of measurement can be made equal for all couples and held constant at all times.

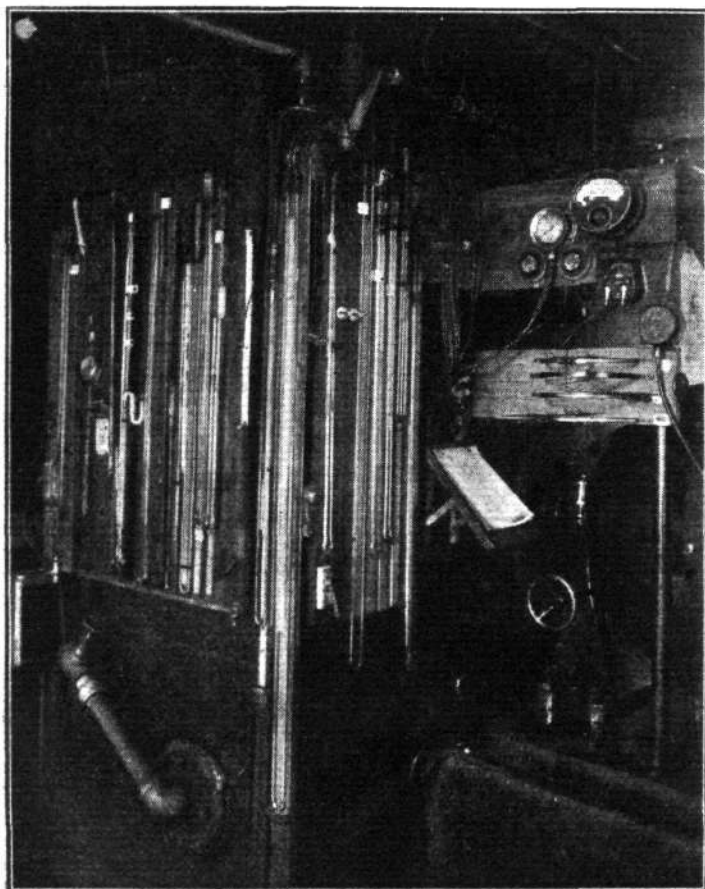


Fig. 13.—Manometer board

Fuel Weighing Device

The fuel used by the engine may be measured in either of two ways: by means of an accurately calibrated tank, or by two tanks mounted on platform scales. The first method gives the volume, and the second the weight of fuel used. When using the weighing tanks, a test may be run continuously, one tank being filled while the other is emptying, or two fuels may be compared, as follows: One tank is filled with the fuel to be tested, and the second with a standard comparison fuel. The engine is run first on the standard fuel, and is then changed over to the test fuel, after which a third run is made on the standard fuel. In this way the least possible variation in engine condition is involved.

Storage of fuel is provided in underground tanks, while the measuring tanks are mounted on a platform placed above and in front of the altitude chamber. The fuel is pumped to these, and then flows by gravity to the carburettor. Fuel in the engines tested is kept at the pressure of the chamber by connection through flexible copper tubes.

Miscellaneous Equipment

Suitable pipe connections are provided for obtaining samples of the exhaust gases from the engine, these samples being then analysed in an Orsat apparatus.

A compressed air system for feeding oil to the engine sump and a means for cooling the oil during a test have been installed.

The laboratory is well supplied with tools and the necessary work benches, so that all ordinary small repairs to both the engines and plant may be made without outside assistance.

A device for damping-out fluctuation in the city water pressure supplied to the plant forms part of the auxiliary equipment.

General Log of Operation

Work on the Altitude Laboratory, as previously stated, was begun in August, 1917, and the plant was ready for the preliminary installation of an engine for test purposes in November of that year. The first engine to be mounted in the chamber was a "Liberty 8," one of the first series of five engines built for experimental purposes. Although this engine was set up in the test-chamber in November, there remained many minor items of experimental equipment to be completed and "turned up" before tests could be begun.

Among these were the development of flexible water-cooled exhaust connections, the completion of air and water piping, the adjustment of the jacket water thermostat and venturi meter, the installation of pressure manometers, gasoline weighing attachments, and temperature measuring devices. The securing of air-tightness of the doors and other connections to the chamber, and a multitude of other minor matters, too numerous to mention, all took considerable time.

On December 26, 1917, the first test run was made with the "Liberty 8" engine for the comparison of two grades of fuel, and for data on the contamination and deterioration of lubricating oil.

On January 4, 1918, the first test at reduced pressure was made, the lowest pressure obtained being 44 cm. below atmosphere, corresponding to an altitude of about 25,000 ft.

In all, seven tests were run with this first experimental engine, representing about fifteen hours' actual running time. The records of these first tests show that many stops for various causes, most of which were chargeable to difficulties with the engine. This was to be expected, since the eight-cylinder model had not at that time reached a stage of perfection to warrant its use for research purposes. In fact, at that time this model had been temporarily abandoned in favour of the twelve-cylinder engine, which was then being perfected.

On January 19, a connecting-rod gave way during test No. 8, and it was decided to abandon the "Liberty 8," then obsolete, and continue work with an Hispano-Suiza engine until the "Liberty 12" was in shape for research on altitude effects.

On January 25, the first experimental run was made with the Hispano-Suiza engine. This test included the first complete set of observations under conditions corresponding to a series of altitudes up to 30,000 ft.

In the year which has elapsed between January 25, 1918, and January 31, 1919, about 150 complete altitude "flights" have been made, comprising only a little less than 1,000 hours of actual engine operation.

Observations have been made with the following models of aircraft engines:—

of aircraft engines:—			
"Liberty 8" ..		Hispano-Suiza ..	300 h.p.
Hispano-Suiza ..	150 h.p.	"Liberty 12" ..	400 h.p.
Hispano-Suiza ..	180 h.p.		

Of these models, several different engines of the 150 h.p.

Hispano-Suiza, 180 h.p. Hispano-Suiza, and "Liberty 12" types have been included.

As mentioned previously, the operation of the "Liberty 12" required the addition of a water brake to the dynamometer, and a number of other modifications in the equipment. These changes were made, and the first series of runs with the "Liberty 12" was begun on October 10, 1918.

General Nature of Research Undertaken

The problem first presented by the National Advisory Committee for solution by the use of the altitude laboratory, was that of the performance of different grades of gasoline at high altitudes in typical aircraft engines. The lubrication Division of the Signal Corps requested also the preservation of samples of the lubricating oil to determine the effect of fuel composition and of altitude on the deterioration of such oils. A staff of two or three men were detailed by the Lubrication Division to assist in securing the desired data.

As different grades of fuel affect engine power and performances only to a very slight extent, the satisfactory solution of this problem required the highest possible accuracy in obtaining complete data on engine performance, as previously outlined. Thus, a practice was established by which all the measurements of power, speed, fuel consumption, barometric pressure, air and water flow, temperature, and pressure, provided for by the apparatus, are customarily made, no matter what is the immediate purpose of the test in hand. The result is, in addition to the data directly desired, an accumulation of valuable supplementary data on engine performance, much of which has not yet been analysed.

Observations have been made to determine specifically the following relations:—

- (1) Horse-power-altitude relation for engines at normal speed.
- (2) Horse-power-speed relation at a range of altitudes up to 20,000 ft.
- (3) Horse-power-compression ratio for normal speed, using compression ratios of 4.7, 5.3 and 6.2 to 1 at a range of altitudes up to 30,000 ft.
- (4) Horse-power-inlet air temperature at a range of speeds and altitudes.
- (5) Effect of variation of intake pressure on horse-power at a range of altitudes, to simulate the effect of supercharging equipment.
- (6) Effect of exhaust back pressure on horse-power, over a limited range of pressures.
- (7) Mechanical losses at various speeds, altitudes, and engine temperatures.
- (8) Metering characteristics of a number of different types of carburettors, with and without altitude compensation or control, for the full range of speeds and altitudes.
- (9) Optimum mixture ratios for maximum power over the range of speeds and altitudes, with several different carburettors.
- (10) The performance of a number of automatic and hand-operated altitude compensation devices for different carburettors.
- (11) The total heat distribution for all speeds and air densities at full throttle.
- (12) The performance of special fuels: "Hector," a combination of cyclo-hexane and benzole; "Alco-gas," a combination of alcohol, benzole, gasoline, and ether, at a compression ratio of 7.2 to 1.

Other relations have been investigated from time to time. Moreover, the detailed records taken for each test include much information bearing on other characteristics of engine performance, such as, for instance, the behaviour of spark plugs and ignition systems under conditions of low air pressure and temperature.

APPENDIX

The New Dynamometer and Altitude Laboratory

As previously stated, the Altitude Laboratory will soon be housed in a permanent building, which is being erected near the present temporary structure. A floor plan and side elevation of this building are given in Fig. 8. As will be seen from these drawings, the building has a rectangular floor plan, measuring 50 by 150 ft., and is constructed of brick and concrete in a thoroughly substantial manner.

The altitude chambers, of which there are two, are built at the west end of the building. A central passage-way connects the two chambers, with separate doors into the chambers and into the main laboratory. The chambers are identical as to their interior arrangements. The cooling coils are mounted in the upper portion of the chambers, and the exhaust is carried to settling tanks in a pit alongside the west wall of the building. The vacuum pumps,

with their electric motors, are placed near these tanks, as shown. In testing a single large engine at high altitudes, the doors between the two chambers may be left open, which permits the use of the two vacuum pumps and banks of cooling coils, thus greatly increasing the capacity of the plant.

In connection with one of the chambers, two 300 h.p. electric dynamometers and with the other one 400 h.p. dynamometer will be used. The necessary switchboards and the grids for dissipating the electrical energy are clearly shown in the elevation. The foundations of the dynamometers are provided with extension bedplates at the ends opposite the chambers, on which to mount engines for test purposes when it is not necessary to conduct the test at other than ground conditions. When running in this way, the couplings between the altitude chambers and the dynamometers can be easily disconnected.

A space is provided in the centre of the floor plan for the installation of either a drum or tractor type dynamometer, on which to test motor vehicles and transmission assemblies. The power delivered to the drums or caterpillars may be transmitted by chains to the two electric dynamometers shown in the drawings. Like the ones for the Altitude Laboratory, they are arranged with extension bedplates, so

that they may be used to test separate engines when required.

A third dynamometer with a capacity of 50 h.p. is arranged for coupling to any type of small engine or to the drive shaft of a rear axle assembly for test purposes.

The exhaust gases from the different engines, except those in the altitude chambers, will pass to an underground duct, from which they will be withdrawn by an exhaust fan discharging through a pipe in the roof.

For about one-third of its length at the east end the building is divided into a basement, main and mezzanine floors. In the basement is placed the refrigerating plant for the Altitude Laboratory, with space left for other machinery. The north side of this portion of the main floor is occupied by the machine shop, designed to care for all the ordinary repairs to the plant and engines. On the south side are located the office, toilet and wash room, and the tool and store room. The mezzanine floor is divided into two laboratory rooms, which may be used for any of the lighter testing apparatus.

The plant will be equipped with travelling chain-hoists for the convenient handling of engines, and other apparatus, and with the necessary work benches, etc.

It is planned to have the laboratory in running order this summer.

HONOURS

THE following announcements appeared in a supplement to the *London Gazette* on October 17:—

The King has been pleased to approve of the award of the following medals to the undermentioned men:—

Meritorious Service Medal.

C.P.O. Mech., 2nd Gde., A Beacham, R.N.A.S., O.N. F 512; P.O. Mech. S. G. Cann, R.N.A.S., O.N. F 4231; C.P.O. Mech. 3rd Gde., T. Clarke, R.N.A.S., O.N. F 1627; Ldg. Mech. D. Cochrane, R.N.A.S., O.N. F 4435; C.P.O. Mech., 3rd Gde., A. T. Corbin, R.N.A.S., O.N. F 1630; C.P.O. Mech., 3rd Gde., P. Garner, R.N.A.S., O.N. F 535; C.P.O. Mech., 3rd Gde., G. H. Gyton, R.N.A.S., O.N. F 1004; P.O. Mech. R. A.

Heath, R.N.A.S., O.N. F 2821; C.P.O. Mech., 3rd Gde., H. Hulse, R.N.A.S., O.N. F 493; C.P.O. Mech., 3rd Gde., H. Moliver, R.N.A.S., O.N. F 1870; P.O. Mech. S. Parsons, R.N.A.S., O.N. F 863; P.O. Mech. H. L. Rolt, R.N.A.S., O.N. F 5678; P.O. Mech. D. D. Slater, R.N.A.S., O.N. F 9501; P.O. (C.) H. C. Smith, R.N.A.S., O.N. F 20242; C.P.O. Mech., 3rd Gde., A. W. H. Tracy, R.N.A.S., O.N. F 6694; C.P.O. Mech., 3rd Gde., C. Underwood, R.N.A.S., O.N. F 1591.

The following man has been brought to the notice of the Admiralty for valuable services in the prosecution of the War:—C.P.O. Mech. R. Harper, R.N.A.S., O.N. 344641 (Po.).

CIVILIAN FLYING IN INDIA

THE authoritative announcement which is this week made that the Government of India have now announced their policy on the important question of civil aviation heralds a distinct movement in official attitude towards public service aviation. It is, it is stated, based on two guiding principles. The first is that a large organisation, with a few well-placed maintenance centres, is economically more sound than several small organisations involving many maintenance services. The second is that an air transport organisation should not be dependent on any particular aircraft construction company.

In accordance with these principles, the Government of India consider that civil aviation will best be developed in India by the grant of a monopoly for a term of years for the carrying of mails by air, throughout India and Burma, to a single air transport company, which should be independent of any particular aircraft construction company. The monopoly would be limited to the carriage of mails,

and the postal rates would be fixed by Government. The company would have a free hand in fixing rates for the carriage of other goods and passengers in open competition with any other companies which might be established for such traffic.

It is recognised, however, that a mail monopoly company, with a well-organised system of maintenance centres, would probably be able to shut out competition for other traffic unless it abused its position. The terms of the monopoly would require careful consideration and discussion, and firms or groups of firms have been invited, through the chambers of commerce, to communicate to the Commerce and Industry Department, as a basis for discussion, the conditions which would be agreeable to them.

The Government have been advised that maintenance centres at seven places—Bombay, Calcutta, Madras, Karachi, Delhi, Nagpur and Rangoon—would be sufficient for the service of all probable routes in India and Burma.

THE AVRO BLACKPOOL-MANCHESTER SERVICE

THE daily return air service between Blackpool, Southport and Manchester, carried out during the summer by Messrs. A. V. Roe and Co., Ltd., has now come to an end. Of the 222 flights scheduled, 194 were carried out, the other 28 being prevented by weather conditions. The number of miles flown was 8,730.

The service was started on May 24, three and a half weeks after civil flying was legalised in Great Britain. It was the first daily service by air to be instituted in this country and to be mentioned in railway guides. It was in every way a pioneer undertaking, for when it was commenced the general public still had the impression that flying was a dangerous undertaking only indulged in by extremely venturesome spirits. Outside the R.A.F. there were no records of a daily air service to guide the Avro company in organising such an undertaking. Yet the service ran for 18½ weeks with no interruption except through bad weather on 14 days. We are informed that there were no mishaps of any sort, not even a simple forced landing.

Before long the pilots grew so familiar with the route that

they could find their way through weather which would have baffled a stranger.

Punctually at noon each day at least one Avro left the sands at South Shore, Blackpool, and headed for Southport, which was reached at 12.15 p.m. At 12.45 the machine would descend at Alexandra Park, Manchester. The return flight started from this aerodrome at 2 p.m. The fare was five guineas for a single, nine for a return ticket.

By degrees the service became popular, and before long it was paying its way. No passengers ever suggested that good value had not been received for his or her money—and the shrewd people of Lancashire are authorities on what constitutes good value. On the contrary, one and all were delighted, and many expressed the opinion that aerial transport had come to stay, as being the quickest and most enjoyable method of getting from town to town.

Whatever the Post Office may think, the people of Lancashire have no doubts as to the reliability of an air service carried out by Avro aeroplanes, backed by sound organisation and good pilots.



THE Nation's Outlook. To all whom it may concern.

"WORK or Sink; then there will be nothing to wrangle about."—Mr. Lloyd George.

"THIS country will be saved by the brains and energy of the individual, and not by enactments which curtail production and only lead to sloth instead of encouraging ambition and enterprise. In the present day we hear a deal about starva-

claims that the Convention fails to protect certain American rights—or should it be "Wrights"? But as there is still a period of six months in which the United States can signify its approval, there is no need to worry about the ultimate result. In the meantime the Convention is in abeyance until such time as the rules are brought into force by decree.

In South America, aviation is regarded seriously. Brazil is the latest to lay the foundation of an air force. Col.



New Avro Types: Our photograph shows the new Avro limousine, 150 h.p. B.R.I. engine. The passengers are seated inside the enclosed cabin, which is entered through triangular-shape doors in the sides. Through the Triplex windows a good view is obtained, while the noise from the engine does not penetrate to the cabin to any great extent

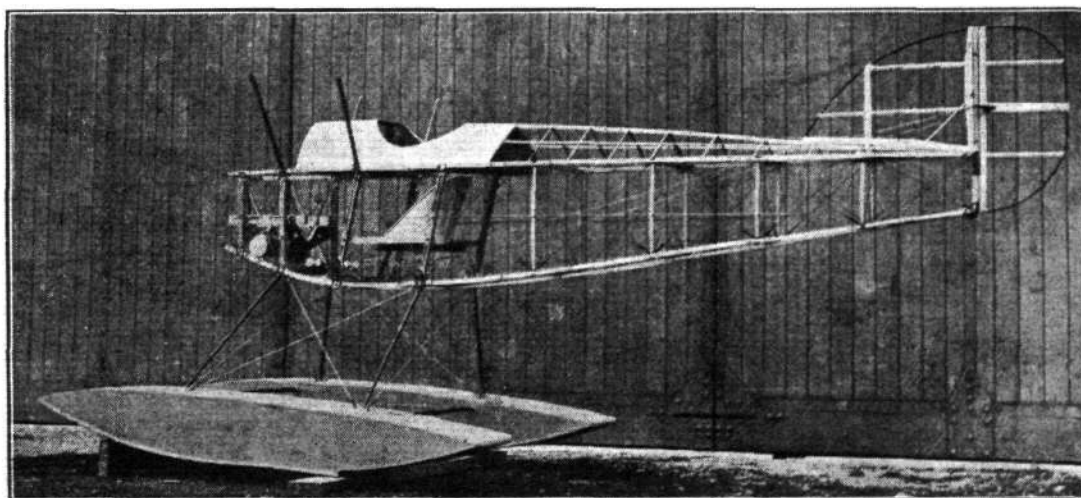
tion. Is a standard wage going to stave it off? There is no surer way of hastening it. We must find our own level, we must go through the Mire of Despond before we can attain Mr. Lloyd George's Garden of Eden. The essentials are individual ambition and determination, a consuming desire to achieve, and not merely a desire for higher wages; payment in relation to efficiency, and not by an arbitrary standard. . . . Let the Government allow each individual to work out his own ambition and betterment instead of trying to do it for him; let the inefficient go to the wall, and there, with their backs against it, make good."—Mr. Malcolm Arbuthnot.

Mangin, Chief of the French Aviation Mission to Brazil, has orders to buy for the Brazilian Army all the material required for the formation of an aerial bombing and observation squadron.

AND Chile is also coming into line, through European help.

AN aerial "taxi" service in Thousand Islands, Canada, is the latest scheme for next summer. The proposal to establish this service is put forward by Capt. Baskerville, formerly Flight-Commander of the 117th Squadron, R.A.F.

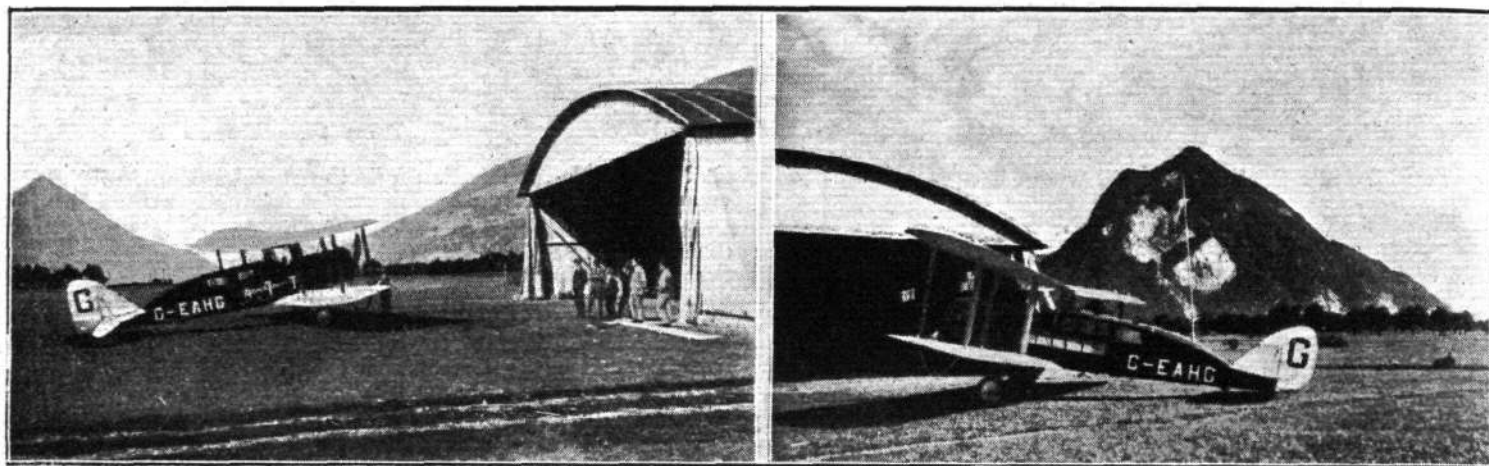
New Avro Types: The annexed photograph shows the fuselage of an Avro Baby, fitted with floats. This machine, which was fully described in "Flight" of June 26, 1919, flies extraordinarily well as a land machine, and although the extra weight of the floats may reduce the speed and climb somewhat, the Baby should still have quite a good performance as a sea-plane.



ON the top of all now comes the "job"-stunting 6-hours-a-day lunatic.

ON October 13, thirteen Allied Powers signed, at the French Foreign Office, the International Aerial Navigation Convention. The United States and Japan did not append their signatures, which would have carried the number beyond the ominous *thirteen*. So far as the United States is concerned, their objection to sign is that their Patent Office

ENGLAND and France are not the only spots where aeroplanes have been "realised" by being burnt. At Archangel—with a good deal more solid reason—our aircraft has also been ruthlessly "dismantled" by fire. Prior to the British departure from Northern Russia, it was considered wise that most of our war material should be disposed of in such manner as to render it of least value to the Bolshies, in case they, as was considered possible, got into possession of Archangel. Under this scheme it is stated that many brand new 200 h.p.



MAJ. STUART-WORTLEY'S D.H. 4a AT INTERLAKEN, SWITZERLAND: Maj. Stuart-Wortley took this machine over with a view to giving demonstration flights

aero engines were thrown into the river, aeroplanes were crashed (a pleasant job for somebody) and 150 new propellers were burned in one impressive bonfire. The aeroplane ship *Pegasus*, crowded to its utmost capacity, carried bombs as ballast.

In the W.O. statement of thanks just issued, following the successful evacuation of the British troops from North Russia, a new note of official sarcasm is struck. And we are glad to note it. It is refreshing to know that those papers, whether from Bolshie-Hun leanings, or as a stunt for increased circulation purposes and damn the Nation's interests, which have so persistently attacked our co-operation, by Navy, Army and R.A.F., with the best elements in Russia, have been badly left. Fortunately it would appear as if our help had been maintained sufficiently long for the true Russian patriots to finish the fight on their own, to the regeneration of their own country and, it is to be hoped, the final peace of the world. The official note is worth reproducing, so here it is:—

"The military authorities are much indebted to a certain section of the Press, who by their repeated asseverations as to the doubtful sincerity of the Government in their policy of evacuation and suggestions of intended offensive operations far into the interior of Russia, succeeded in mystifying the Bolsheviks as to our real intentions even more than the British public. This atmosphere of uncertainty, which could

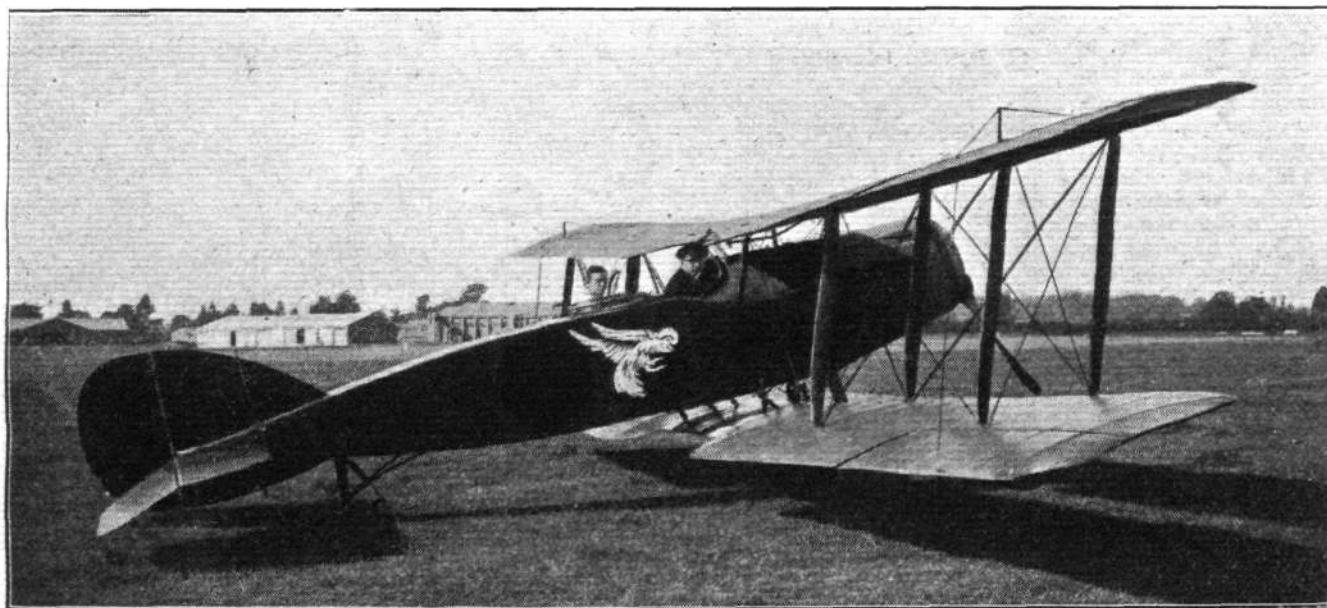
never have been created so effectively by any Censorship, was exactly what was required to cover an operation of this kind."

Apropos our reference last week to the Allies Council sitting up and taking notice of Germany's transgression in regard to the air clauses of the Peace terms, the *Evening Standard* carries the point a step further and confirms that notice is being taken in official circles of Germany's possible efforts to evade the Peace terms with regard to Article 201 of the Treaty, by which the Germans are forbidden to make or import aircraft of any description during six months after the Treaty comes into force.

The Supreme Council at Paris has had under consideration recently the question raised by Germany's development of services of commercial aeroplanes. While the matter is not considered one for alarm or sensational outcry, it is felt that Germany's action in this connection is to be closely watched.

With regard to aerial post services, for example, there is no guarantee that such services may not be diverted from their original purpose.

Observation is also being kept on Germany's sale of aeroplane material not only to Sweden but to other countries. There is no doubt that, in her present straitened circumstances the country is selling everything on which she can raise money, but the Supreme Council forbade Germany as far back as August last to sell any of its air material.



"STILL GOING STRONG": The short life of an aeroplane is a weapon much beloved by those who refuse to believe in the possibilities of commercial aviation. As a matter of fact, with reasonable care, the life of a well-built machine is much longer than is generally thought. By way of an example, we publish above a photograph of a Bristol Fighter which has been in continuous commission on the fighting front and in Holland for over two years without, we are assured, the expenditure of a single penny on renewals or repairs. Recently this machine paid a visit to this country, piloted by the famous Dutch pilot, Versteegh, who was accompanied by another Dutch officer. While in this country the machine paid several flying visits to places in various parts of the country, including its old home and birthplace at Filton, Bristol.

There is no reason to believe at present that such flagrant attempts to evade the Treaty are being made with regard to Zeppelins.

APPARENTLY our brethren across the Tweed do not relish taking lying down the proposed closing of East Fortune Aerodrome. At a meeting of the East Lothian County Council in Haddington last week, Sir Arch. Buchan Hepburn, Bart., the chairman, entered a vigorous protest against its removal. He referred to the vital manner in which the Council would be affected by the roads, which had been specially altered to meet the construction of the aerodrome. It meant the upsetting of all their plans. It was of supreme importance that the aerodrome should remain for the protection of the Forth and the East of Scotland generally. The expense of building must have cost millions. He could see no economy in removing the aerodrome to Yorkshire. It was left to the chairman and the clerk to take the most effective method of protesting against the removal.

In the meantime the matter is regarded "vara" seriously as a "flouting of Scottish interests" and so on. Provost Ross especially has waxed wrath in his declaiming of the Government action. So that Westminster had best take notice in due time lest worse befall them than the mere receiving of resolutions of disapproval. For the Provost hoped that "the time was not far distant when Scotland would have more control of Scottish affairs, and when these would be settled in Edinburgh, without going to London."

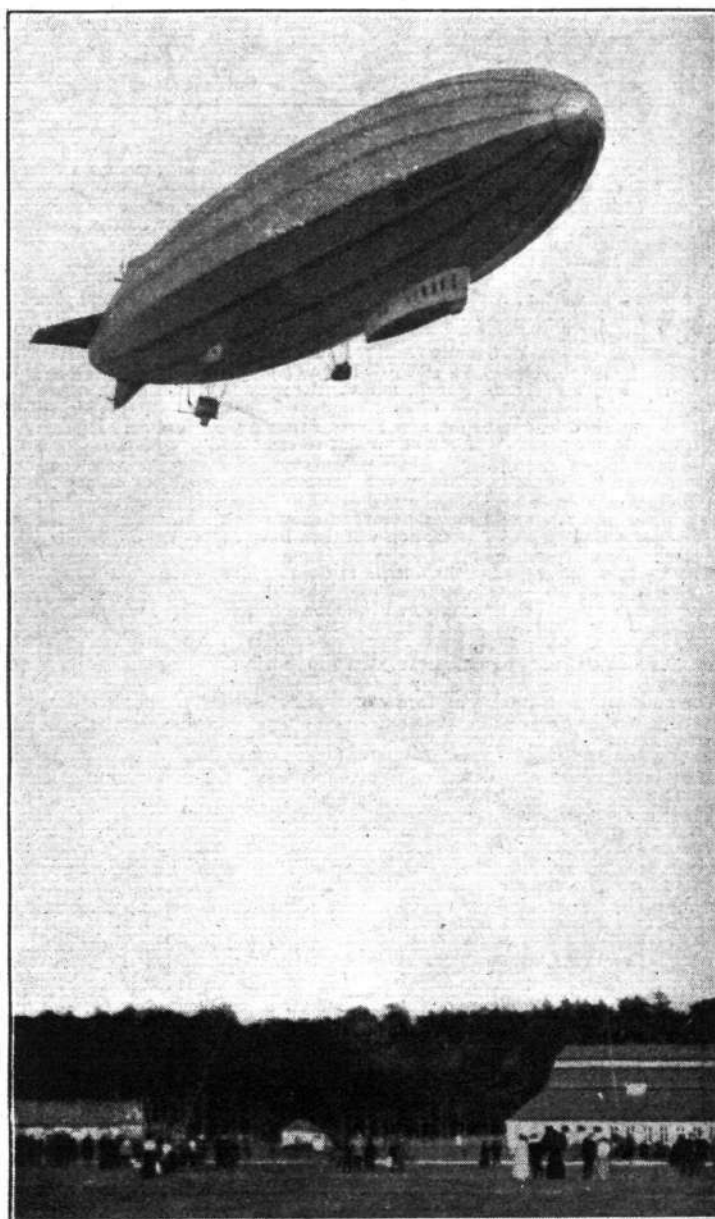
As copies of this protest have been sent to the Prime Minister, the Secretary for Scotland and Mr. John D. Hope, M.P., no excuse, in carrying out their campaign of economy, can avail that they had no cognisance of the trouble brewing. But what might be interesting to know, under all these conditions, is whether the Nation found the cash for this little venture or the local ratepayers.

THE AVRO.
is faster than trains.

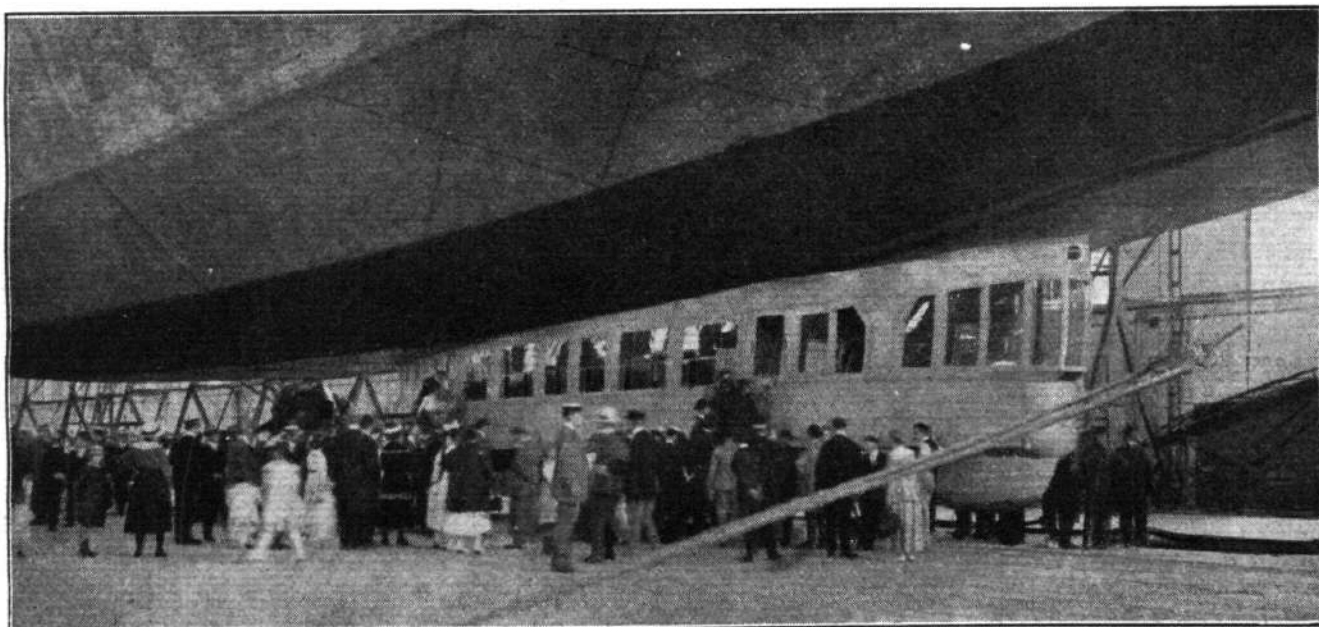
30,000 passengers carried since
1st May from
30 stations in Great Britain.

The AVRO will take you anywhere
It is the
TAXI of the AIR.

The above advertisement now appearing in the press daily should give even the most sceptical in regard to the future of aviation, to think furiously.



THE "BODENSEE": A description of this airship was published in "Flight" of September 25, 1919. The navigator's cabin and passenger cabin are in the front gondola



THE HAMBURG-AMERICAN LINE AIRSHIP THE "BODENSEE": View of the forward cabin. This airship is running an air service between Berlin and Friedrichshafen on Lake Constance

THE ROYAL AIR FORCE

London Gazette, October 10

The following officers have been granted short service commissions in the ranks stated, with effect from Oct. 10. They will retain their seniority in the substantive rank last held by them prior to the grant of the short service commission:—

Squadron Leader.—R. C. Lane (T.).
Flight Lieutenants.—J. H. D. M. Campbell (S.O.); H. Cooch, A.M.I.E.E. (T.); P. E. L. Gethin, A.F.C. (A.); E. L. Johnston, A.F.C. (Airship); C. O. F. Modin, D.S.C. (A.); A. J. Osborn (S.O.); G. W. Roberts, M.C. (A.); N. V. Wrigley (T.).

Flying Officers.—R. M. Grundy (Ad.); H. Hoad (T.); A. E. de M. Jarvis, D.F.C. (A.); A. A. Jones (T.); H. P. G. Leigh (T.) (with effect from Oct. 6); F. W. Martyn (T.); H. L. Rough, D.F.C. (A.); E. R. Webb (Ad.).

NOTE.—It is intended that officers employed as Stores Officers or on "Q" duties shall belong to the new Stores Branch when formed. Officers appearing in this Gazette who are at present so employed will be transferred to this branch on its formation, and will accept these short service commissions on that condition. They will then come on to rates of pay of that branch, but will meantime be permitted to draw the higher rates laid down in the new scheme for officers on the General List. Any officer posted to the Stores Branch on its formation will then have the option of declining his short service commission.

The notification appearing in Gazette of Sept. 12 appointing the following officers to short service commissions is cancelled:—Flight Lieut. H. J. Edgar (A. and S.); Flight Lieut. A. E. Siddons-Wilson (T.); Flying Officer J. H. Dale (T.); Flying Officer H. B. Day (Ad.); Flying Officer A. G. Jarvis (A.); Flying Officer R. V. Kann (A.); Flying Officer G. A. Lingham, D.F.C. (A.); Flying Officer W. G. Pudney (A.); Flying Officer A. E. Sweeting (A.).

The notification appearing in Gazette of Sept. 16 appointing the following officer to a short service commission is cancelled:—Flight Lieut. C. W. McCann (T.).

The second Christian name of Flight Lieut. Charles Geoffrey Murray, O.B.E. (S.O.), is as now described, and not Godfrey, as stated in Gazette Sept. 12.

The second Christian name of Flying Officer James Duff Hewett (A.) is as now described, and not Dorr, as stated in Gazette Sept. 16.

Flying Officer A. C. Lobley is granted a short service commission with effect from Aug. 16, not Sept. 12 as stated in Gazette of the latter date.

The following temporary appointments are made at the Air Ministry:—

Staff Officers, 3rd Class.—(P.) Flight Lieut. J. B. Cole-Hamilton; Sept. 26. (T.) Flying Officer C. A. Longhurst; Sept. 30.

Staff Officers, 2nd Class.—(Q.) Sqdn. Leader F. H. Moody, M.C.; Sept. 1.

Staff Officer, 3rd Class.—(P.) Flight Lieut. D. P. Massy; Sept. 1.

Flying Branch

Lieut.-Col. H. A. Williamson, C.M.G., A.F.C., to be Lieut.-Col. (A. and S.) on relinquishing appointment of Group Comdr.; April 25.

Capt. C. J. W. Darwin, D.S.O., to be Capt. (A.), from (T.); July 5.

Flight Lieut. A. McR. Moffatt to be Flight Lieut. (A.), from (S.O.); Sept. 13.

Second Lieutenants to be Lieutenants:—A. C. Clinton; Oct. 26, 1918 (substituted for notification in Gazette July 2, 1918). S. Toby; Dec. 27, 1918. (Hon. Capt.) G. E. Lange; Jan. 1. L. G. Destrubers; June 6. R. A. Wade; June 16. F. Van-Praagh; July 10. S. L. Walters; July 24.

P.F.O. A. J. Mantle, D.F.C. (late R.N.A.S.), is granted a temporary commission as Sec. Lieut. (O.); July 18, 1918.

The following relinquish their comms. on ceasing to be employed:—Lieut. A. T. Essex (Sec. Lieut., British W. Indies R.); July 29. Lieut. (Hon. Maj.) G. T. J. Barry (Maj., S. Wales Bord.); Sept. 11. Lieut. G. W. Kempster (Lieut., Middx. R.); Sept. 15. Maj. W. Pennefather (Lieut.-Comdr., R.N.); Oct. 9.

(Then follow the names of 99 officers who are transfd. to the Unemployed List under various dates.)

The following Lieuts. relinquish their comms. on account of ill-health, and are permitted to retain their rank:—A. W. Hammond, M.C. (caused by wounds); Sept. 6. B. L. Blofeld (Lieut., R. West Kent R.) (contracted on active service); Sept. 26. A. McDunlop (contracted on active service); Sept. 30.

G. H. Jacob; Oct. 4 (substituted for notification in Gazette Sept. 21).

Lieut. R. A. Way (Lieut., Wilts R.) resigns his commission; Oct. 11.

Sec. Lieut. C. C. Worboys relinquishes his commission on account of ill-health contracted on active service, and is permitted to retain his rank; Oct. 8.

Lieut. J. C. Sherwin is dismissed the service by sentence of a General Court-Martial; Sept. 12.

Sec. Lieut. L. E. G. Judge, M.C., to take rank and precedence as if his appointment as Sec. Lieut. bore date Dec. 24, 1918.

The Christian names of Sec. Lieut. Edward Raymond Beesley are as now described, and not "Ernest Richard," as stated in Gazette June 4, 1918.

The notification in Gazette April 4 concerning Lieut. J. H. Solomon is cancelled.

The notification in Gazette June 6 concerning Sec. Lieut. E. W. A. Smith is cancelled.

Administrative Branch

Sec. Lieut. A. F. Harris to be Sec. Lieut., from (O.); July 29.

Pilot Officer D. S. G. Burton to be Pilot Officer, from (T.); Sept. 29.

Sec. Lieut. W. Farquharson to be Sec. Lieut., from Unemployed List; Sept. 24 (precedence next below H. H. Williams).

The following relinquish their commissions on ceasing to be employed:—Sec. Lieut. R. F. Nicholls; Oct. 13, 1918. Sec. Lieut. G. Hull (Sec. Lieut., R.I. Rif.); Aug. 19. Lieut.-Col. (actg. Col.) A. W. G. McFall (Lieut.-Col., ret'd., Militia); Sept. 18. Capt. G. F. Earle (Capt., Rif. Bde.); Sept. 29.

(Then follow the names of 12 officers who are transfd. to the Unemployed List under various dates.)

Lieut. (Hon. Capt.) H. O. D. Wilkins (Capt., Bedf. R.) resigns his commission; Oct. 11.

Sec. Lieut. J. H. Young relinquishes his commission on account of ill-health, and is permitted to retain his rank; Sept. 23.

Sec. Lieut. H. S. Neville relinquishes his commission on account of ill-health, and is permitted to retain his rank; Sept. 30.

The notifications in Gazette of Sept. 23 concerning Flight Lieut. G. M. Broadburn and Flying Officer J. A. H. Savage are cancelled.

Technical Branch

Capt. (actg. Maj.) C. J. W. Darwin, D.S.O., retains actg. rank of Maj. whilst employed as Maj., Grade (A.), from (Ad.), from Feb. 8 to April 30.

Capt. C. J. W. Darwin, D.S.O., is graded for purposes of pay and allowances as Maj. whilst employed as Maj., Grade (A.), from May 1 to July 4.

Capt. F. Workman, M.C., to be Capt., Grade (A.), from (A.); May 9, 1918 (substituted for notification in Gazette of Aug. 5).

Sec. Lieut. S. Jupp is graded for purposes of pay and allowances as Capt. whilst employed as Capt., Grade (A.); Oct. 9, 1918 (substituted for notification in Gazette of May 1).

Pilot Officer (Hon. Flying Officer) C. Bishop to be actg. Flight Lieut. (without pay and allowances of that rank) whilst employed as Flight Lieut., Grade (B.).

Sec. Lieut. E. A. Moran-Smith to be Lieut.; Sept. 14, 1918 (substituted for notification in Gazette of April 11).

Pilot Officer G. H. J. Stein relinquishes the grading for pay and allowances as Flying Officer on ceasing to be employed as Flying Officer, Grade (A.); Sept. 19.

Sec. Lieut. J. S. McLeod to be Sec. Lieut., Grade (B.), from (Ad.); June 15. Lieut. (Hon. Maj.) C. W. Rowe, M.B.E. (Maj., Huntingdonshire Cyclist Bn.), relinquishes his commn. on ceasing to be employed; Nov. 7, 1918.

Sqdn. Leader H. R. Northover, O.B.E., M.C. (Maj., Canadian Ordnance Corps), relinquishes his commn. on ceasing to be employed; June 30.

Sec. Lieut. (Hon. Lieut.) J. L. Bicknell (Lieut., Gloucester R.) relinquishes his commn. on ceasing to be employed; Oct. 3.

(Then follow the names of 16 officers who are transfd. to the Unemployed List under various dates.)

The following Lieuts. relinquish their comms. on account of ill-health contracted on active service, and are permitted to retain their rank:—H. R. Stewart; Sept. 30. A. A. Westcott; Oct. 4.

Medical Branch

Lieutenants to be Captains:—J. P. Horsford; July 5 (substituted for notification in Gazette Aug. 19, wherein this officer's surname was described as "Horsford"); G. W. J. Bousfield (substituted for notification in Gazette Aug. 19, wherein this officer's surname was described as "Bousfield"); A. St. J. Hennessy (substituted for notification in Gazette Aug. 19, wherein this officer's surname was described as "Hennessy"); July 29.

Maj. H. F. Horne relinquishes his commn. on ceasing to be employed, and is granted rank of Lieut.-Col.; July 2.

Two officers transfd. to the Unemployed List.

The surname of Capt. K. B. Aikman is as now described, and not "Aickman," as stated in Gazette Aug. 19.

The notification in Gazette July 11 concerning Maj. H. F. Horne is cancelled.

Memoranda

Temp. Hon. Lieut. (Hon. Capt.) W. S. Kellar relinquishes his commn. on ceasing to be employed; Aug. 20.

London Gazette, October 14.

The following temporary appointments are made:—

Air Commodore.—Air Commodore R. M. Groves, C.B., D.S.O., A.F.C., from Director; Sept. 8.

Staff Officer (1st Class).—(Air).—Wing Comdr. K. G. Brooke, C.M.G., from S.O. 1 at the Air Ministry; Oct. 8.

Staff Officers (2nd Class).—(P.).—Sqdn. Ldr. A. G. R. Garrod, D.F.C., M.C.; Oct. 6. (Air).—Sqdn. Ldr. R. M. Field; Oct. 7.

Flying Branch

Lieut. A. A. Leitch is graded for purposes of pay and allowances as Capt. whilst employed as Capt. (A.); May 27.

The following Flying Officers relinquish the grading for pay and allowances as Flight Lieuts. on ceasing to be employed as Flight Lieuts. (A.):—H. G. W. Debenham; Aug. 28. C. T. Black; Sept. 5.

The following Flying Officers (actg. Flight Lieuts.) relinquish actg. rank of Flight Lieut. on ceasing to be employed as Flight Lieuts. (A.):—A. D. K. Perkins; Sept. 5. N. C. Buckton; Sept. 10.

Sec. Lieuts. to be Lieuts.:—J. Duncanson; April 2, 1918. J. H. L. Newby; July 12, 1918. J. S. Maguire; Sept. 26, 1918. R. J. Hook; Nov. 30, 1918. C. A. Stubbings; Dec. 27, 1918. W. Barlow; Jan. 1. C. S. Goode; July 7. F. G. A. Terrill; July 21.

Pilot Officers to be Flying Officers:—J. S. Hunt; Sept. 3. W. H. Dunton, A. T. Robson; Oct. 1.

Sec. Lieut. L. J. W. Ingram (late Gen. List, R.F.C., on prob.) is confirmed in rank as Sec. Lieut. (O.); June 23, 1918.

The following relinquish their comms. on ceasing to be employed:—Lieut. J. H. Solomon; March 7. Maj. G. Allen (Capt., Conn. Rags.); Aug. 11.

Lieut. R. S. Mackenzie (Lieut., Can. Cav.); Sept. 21. Lieut. C. A. Bridgland, D.F.C. (E. Surr. R.); Sept. 26. Sec. Lieut. C. P. Stromeyer (Lieut., R.G.A.); Oct. 7.

(Then follow the names of 211 officers who are transfd. to the Unemployed List under various dates.)

Maj. A. K. Robertson relinquishes his commn. on account of ill-health, and is permitted to retain his rank; Oct. 2.

Lieut. R. C. Steele relinquishes his commn. on account of ill-health, and is granted rank of Capt.; Oct. 7.

The following Lieuts. relinquish their comms. on account of ill-health, and are permitted to retain their rank:—J. A. Harkin; May 20. (substituted for notification in Gazette of Feb. 25). P. H. Baker (caused through wounds); Oct. 2. W. S. Anderson (contracted on active service), R. M. J. Bate (contracted on active service), U. Finch (contracted on active service), C. Gilham (caused by wounds); Oct. 2. T. S. Byrn (contracted on active service), J. B. Corcoran (contracted on active service), H. W. Smith (caused by wounds); Oct. 7. W. Adamson (contracted on active service), W. C. Johnston (caused by wounds), R. G. Lye (caused by wounds); Oct. 8.

Sec. Lieut. (Hon. Lieut.) E. G. Pernet relinquishes his commn. on account of ill-health caused by wounds, and is permitted to retain the rank of Lieut.; Oct. 7.

J. F. Stallard (Lieut., D. of Corn. L.I.) resigns his commn.; Oct. 15.

The following Sec. Lieuts. relinquish their comms. on account of ill-health, and are permitted to retain their rank:—R. H. B. Greenyer (caused by wounds); Oct. 2. G. F. Smith; Oct. 3.

Sec. Lieut. M. A. Watts is ante-dated in his appointment as Sec. Lieut. (A.); June 5, 1918.

The Christian names of Sec. Lieut. Leslie Hagger Kemp are as now described and not Leslie Kemp, as stated in Gazette of Sept. 13, 1918.

The notification in Gazette of Sept. 16 concerning P.F.O. L. H. Kemp is cancelled.

The notification in Gazette of Nov. 29, 1918, concerning Sec. Lieut. R. Boyle is cancelled.

The notification in Gazette of April 1 concerning Sec. Lieut. R. Lane is cancelled.

The notification in *Gazette* of May 13 concerning Lieut. L. Patterson, M.C., is cancelled.

The notification in *Gazette* of July 29 concerning Sec. Lieut. G. V. Straker is cancelled. Notification in *Gazette* of July 18 stands.

The notification in *Gazette* of July 8 and Aug. 22 concerning Sec. Lieut. M. A. Watts is cancelled.

The notification in *Gazette* of Sept. 9 concerning Flying Officer E. V. J. Fenelon is cancelled.

The notification in *Gazette* of Sept. 16 concerning Lieut. A. E. N. Ashford is cancelled.

Administrative Branch

Capt. (Hon. Maj.) A. F. Morris is graded for purposes of pay and allowances as Maj. whilst employed as Maj.; July 12.

Flight Lieut. C. S. McNab to be Flight Lieut., from (S.O.); Sept. 20.

Flying Officer S. G. K. Rapley relinquishes his grading for pay and allowances as Flight Lieut. on ceasing to be employed as Flight Lieut.; Sept. 13.

Lieut. (Hon. Capt.) H. G. Whyte to be Lieut. (Hon. Capt.), from unemployed list; Aug. 9, with precedence next below Lieut. E. King.

Flying Officer J. V. Ould to be Flying Officer, from (A.); Sept. 18.

The following Flying Officers (S.O.) to be Flying Officers:—C. E. Crowne, J. H. Evans; Sept. 20.

Sec. Lieuts. to be Lieuts.:—T. C. Noble; April 2, 1918. F. J. Deane; April 21. D. D. Carcary; Aug. 7.

Sec. Lieut. R. P. Briscoe is graded for purposes of pay and allowances as Lieut. whilst employed as Lieut.; May 1.

Pilot Officer O. V. Lee to be Pilot Officer, from (A. and S.); Sept. 8.

Pilot Officer H. C. McKinley to be Pilot Officer, from (O.); Sept. 26.

Sec. Lieut. R. R. W. Millward (late Gen. List, R.F.C., on prob.) is confirmed in rank as Sec. Lieut.; June 11, 1918.

The following relinquish their commns. on ceasing to be employed:—Lieut. A. V. Faulks; June 16. Capt. J. B. Morgan; Aug. 9. Maj. C. V. Beresford (Maj., Worc. R.); Sept. 1. Lieut. R. R. Money (Lieut., E. Yorks R.); Sept. 20. Capt. F. Tuttle, D.C.M. (Qrmr. and Capt., R. Berks. R.); Sept. 25.

Sec. Lieut. S. D. Harrower (Sec. Lieut., Bedfordshire R.); Sept. 27.

Capt. D. C. L. Speed, O.B.E. (Capt., King's Royal Rifle Corps); Sept. 27.

(Then follow the names of 39 officers who are transfd. to the Unemployed List under various dates.)

The following Lieuts. relinquish their commns. on account of ill-health and are permitted to retain their rank:—W. B. W. Clarke (contracted on active service), H. H. Wade (caused by wounds); Oct. 2.

The following Sec. Lieuts. relinquish their commns. on account of ill-health, and are permitted to retain their rank:—J. Skinner; Sept. 28. L. G. Davies; Oct. 3. J. W. Rimmer; Oct. 4 (contracted on active service). C. A. Seymour; Oct. 9.

The notification in the *Gazette* of Oct. 7 concerning Sec. Lieut. J. Skinner is cancelled.

The notification in the *Gazette* of Aug. 22 concerning Lieut. (Hon. Capt.) H. G. White is cancelled.

The notification in the *Gazette* of Dec. 24, 1918, concerning Sec. Lieut. R. Boyle is cancelled.

Technical Branch

Sec. Lieut. (actg. Capt.) J. W. Tattersall to be actg. Maj. whilst employed as Maj., Grade (A.); June 10.

Capt. (Hon. Maj.) H. R. P. Reynolds is graded for purposes of pay and allowances as Maj. whilst employed as Maj., Grade (A.); from (Ad.); from Dec. 7, 1918, to June 5.

Capt. E. Rivers-Smith, M.B.E., is graded for purposes of pay and allowances as Maj. whilst employed as Maj., Grade (B.); May 14.

Flight Lieut. W. E. L. Seward, M.C., relinquishes the grading for purposes of pay and allowances as Sqdn. Ldr. on ceasing to be employed as Sqdn. Ldr., Grade (A.); Aug. 20.

To be actg. Capt. whilst employed as Capt., Grade (A.):—Lieut. S. J. Gardiner, Sec. Lieut. P. S. Riach; June 10.

Lieut. L. R. Staddon is graded for purposes of pay and allowances as Capt. whilst employed as Capt., Grade (A.); April 1.

Lieut. P. A. Wright is graded for purposes of pay and allowances as Capt. whilst employed as Capt., Grade (B.), from (Ad.); May 14.

Flying Officer A. W. H. Phillips relinquishes the grading for purposes of pay and allowances as Flight Lieut. on ceasing to be employed as Flight Lieut., Grade (A.); Sept. 17.

Flying Officer E. S. Cohen to be Flying Officer, Grade (B.), from Grade (A.), and relinquishes the grading for pay and allowances as Flight Lieut. on ceasing to be employed as Flight Lieut., Grade (A.); Sept. 8.

Flying Officer (actg. Flight Lieut.) H. G. Wood relinquishes the actg. rank of Flight Lieut. on ceasing to be employed as Flight Lieut., Grade (B.); Sept. 18.

Lieut. F. H. Isitt to be Lieut., Grade (B.), from (Ad.); June 10.

Lieut. E. W. Lawrence is graded for pay and allowances as Lieut. whilst employed as Lieut., Grade (B.); Nov. 12.

Pilot Officer R. McG. Freemanle relinquishes the grading for pay and allowances as Flying Officer, Grade (A.); Sept. 17.

Sec. Lieut. (Hon. Lieut.) W. L. Head to be Lieut., without pay and allowances of that rank; Nov. 24, 1918.

Pilot Officer W. H. Lowther to be Flying Officer, without pay and allowances of that rank; Aug. 5.

Pilot Officer N. F. S. Hecht to be Pilot Officer, Grade (A.), from (Ad.); Sept. 8.

Pilot Officer C. P. Brown to be Pilot Officer, Grade (B.), from (Ad.); Sept. 8.

Pilot Officer W. T. T. Glassbrook to be Pilot Officer, Grade (B.), from Grade (A.); Oct. 8.

The following relinquish their commns. on ceasing to be employed:—Capt. R. C. Gill (Capt., R.G.A.); Aug. 27. Lieut. E. F. L. Taylor (Devon R.); Aug. 31.

(Then follow the names of 38 officers who are transfd. to the Unemployed List under various dates.)

Lieut. H. W. Durnell relinquishes his commn. on account of ill-health caused by wounds, and is permitted to retain his rank; Oct. 8.

Sec. Lieut. W. A. Murphy relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain his rank; Oct. 8.

Medical Branch

Lieut. D. Pennington is transfd. to the Unemployed List; Sept. 27.

Dental Branch

The following are granted temp. commns. as Lieuts.:—G. H. Warner; May 20, 1918 (substituted for notification in *Gazette*, May 21, 1918, in which he is shown under "Medical" Branch). C. Murray-Shirreff; June 6, 1918 (substituted for notification in *Gazette*, June 7, 1918, in which he is shown under "Medical" Branch). C. M. John; July 18, 1918 (substituted for notification in *Gazette*, July 26, 1918, in which he is shown under "Medical" Branch). W. Inman; Oct. 25, 1918 (substituted for notification in *Gazette*, Oct. 29, 1918, in which he is shown under "Medical" Branch).

Chaplains' Branch

The following are transfd. to the Unemployed List:—The Rev. P. G. Levy; May 31. the Rev. J. M. Wood-Smith, M.A.; Sept. 22.

Memoranda

Pilot Officers to be Flying Officers:—F. A. Holmes; Aug. 27. E. A. Cogswell; Oct. 1.

(Then follow the names of 25 Overseas Cadets granted temp. commns. as Sec. Lieuts.)

The following relinquish their commns. on ceasing to be employed:—Capt. J. Williams (Qrmr. and Capt., D. of Corn. L.I.); Oct. 1. Maj. H. M. M. Robertson, O.B.E., M.C. (Maj., R.R.A.); Oct. 6.

Temp. Hon. Lieut. H. Yates relinquishes his commn. on ceasing to be employed; Oct. 7.

(Three officers transfd. to the Unemployed List.)

Personals

Roll of Honour

It was announced by the War Office on October 16 that the following officers, who were previously reported missing, are now reported killed:—

Sec. Lieut. T. W. Abbott, R.F.C.

Sec. Lieut. K. B. Cooksey, R.W. Kent R., atttd. R.F.C.

Sec. Lieut. C. P. Williams, R.F.C.

Deaths

Lieut. EUSTACE JOHN RALLI, who died at the R.A.F. Auxiliary Hospital, Swanage, on October 13, at the age of 21, as the result of injuries sustained on May 8, 1918, while night flying on the defence of London, was the only son of Capt. and Mrs. Stephen Pandeli Ralli, of 43, Great Cumberland Place, W.

Married

Capt. ATHOL D. COLLINS, Worcestershire Regiment and R.A.F., eldest surviving son of D. George Collins, C.C., Shirley Park, Croydon, was married on October 20 at St. James's, Paddington, to AGNES ANNIE RUSSELL, only daughter of Mrs. Russell, Downham, Norfolk.

Capt. NORMAN MCLEOD (late A.O.D. and R.A.F.), eldest surviving son of Mr. and Mrs. J. Y. KENNEDY, of 16, Freeland Road, Ealing, was married on October 16 at St. John's Church, Windermere, to WINIFRED HARDWICK, youngest daughter of the Rev. and Mrs. JOHN MILES MOSS, of Helm, Windermere and Winthwaite, Sidmouth.

To be Married

The engagement is announced between Lieut. ESMOND SELBY ADES, R.A.F., second son of Mr. and Mrs. ADES, of

South End House, Croydon, and MARJORY AILSA, only daughter of Mr. and Mrs. WALTER MCINTOSH, The Poplars, Ryde Vale Road, Balham.

The engagement is announced between RICHARD JOHN MULLINGS, eldest surviving son of the late John Mullings, of Cirencester, and MURIEL, widow of Capt. H. ERIC DIXON, R.A.F., and younger daughter of Col. F. K. S. METFORD, of Fox Elms, Robinswood Hill, Gloucester.

A marriage has been arranged, and will take place on November 19, at St. George's, Hanover Square, between Flight-Lieut. W. W. WAKEFIELD, R.A.F., eldest son of Roger William Wakefield, M.D., and Mrs. Wakefield, of Winder, Cark-in-Cartmel, and ROWENA DORIS, daughter of LEWELYN LEWIS, M.D., and Mrs. Lewis, Maesyrhaf, Neath.

The engagement is announced between Sqdn.-Leader A. T. WHITELOCK, R.A.F., son of Mr. T. R. Whitelock, Barnsley, Yorkshire, and FRANCES MARY, daughter of the late EDWARD BRYNING, J.P., Kirkham, Lancashire.

Items

MAJ. G. H. SCOTT, A.F.C., R.A.F., the commander of the R 34 during her voyage across the Atlantic and back, has been demobilised, and is leaving England for a two months' lecturing tour in the United States.

The Carnarvon Town Council, at the last meeting, unanimously resolved to offer the freedom of the ancient borough of Carnarvon to Wing-Comdr. LIONEL W. BRABAZON REES, V.C., O.B.E., M.C., A.F.C., R.A.F., and to present him with a sword of honour for his distinguished services during the War.

SIDE-WINDS

We learn that Messrs. Handley Page, Ltd., have just been appointed sole agents for the Triplex safety glass in India, Australia, New Zealand, South Africa, and all enquiries with regard to business in the above-mentioned countries should be sent to them.

It will no doubt be welcome news to many visitors to Bournemouth that the Supermarine Aviation Works have decided to carry on with the flying boat trips at Bournemouth during the autumn and winter on suitable and fine days. As the weather is generally good it is anticipated that there will be few blank days during what would ordinarily be termed "the off season." Demonstration and ordinary passenger flights will also continue to be given from the slipway at Woolston near Southampton during the winter months.

On one of the regular weekly trips between London and Holland, Mr. C. Turner recently piloted the British Aerial Transport Co.'s saloon machine from Hounslow to Amsterdam in under three hours.

MESSRS. VICKERS, LTD., announce that as from the 1st inst. the prices of their special alloy "Duralumin" have been reduced. As a guide to present prices it may be stated that on the 15th inst. the basis prices of their various manufactures were as follows:—Sheet and strip, 4s. per lb.; extruded rod and sections, 2s. 11d. per lb.; solid drawn tube, 5s. 6d. per lb.; wire, 4s. 8d. per lb.; rivets, 5s. 11d. per lb.; rolled and drawn angles and channels, 7s. 6d. per lb. Detailed price list of extras for these various sections will be forwarded on application to Messrs. Vickers, Ltd., Vickers House, Broadway, Westminster, S.W.1.

ELECTRIC fans for all purposes are shown in a catalogue which is to hand from the Sun Electrical Co., Ltd., of 118-120, Charing Cross Road, W.C.2. Desk and wall fans are supplied in a wide range of sizes and types, including fixed base, swivel and trunnion, oscillating and convertible wall brackets. Ceiling fans are made in two patterns—for fitting close to the ceiling or on a down rod—and for either continuous or alternating current. Another speciality of this firm is a small power electric motor, the range of models being from 1/30 h.p. up to 1/2 h.p. Anyone interested can obtain a copy of the list by applying to the company at the above address.

A LITTLE booklet to hand from the General Electric Co., Ltd., gives details and prices of the various types of Osram lamps made for automobile and aeronautical work, but which are equally suitable for many other purposes. The filaments are tough and durable and specially supported in each lamp so as to make them vibration-proof. In the headlight lamps the filaments are so arranged that practically a "point source" of light is procured, enabling a parallel beam to be obtained from properly designed reflectors. Users of electric lamps on cars, etc., should make a point of sending for this useful little booklet.



Loading up the B.A.T. commercial aeroplane at Hounslow for its recent emergency flight to Amsterdam, when it carried over 600 lbs. of freightage, including a consignment of Emaillite, urgently wanted by the Dutch Government, and ordered through Messrs. Tashe, the Emaillite representatives in Holland. Note the Customs officer in attendance to seal up the doors

Brown Brothers, Ltd.

THE directors of Brown Brothers, Ltd., are now offering for subscription 75,000 6½ per cent. cumulative preference shares of £1 each at par and 75,000 ordinary shares of £1 each at £1 1s. 6d. per share. Applications may be made for preference shares alone, but any application for ordinary shares must be accompanied by an application for an equal number of preference shares. The company was formed 23 years ago to carry on and develop the business of Brown Brothers, wholesale motor and cycle accessory manufacturers, and recently the company purchased the whole of the shares of James Thomson and Son (Motor Factors), Ltd. The combined profits of the two businesses after charging depreciation and excess profits duty, but before deducting income tax, for 1918 were £53,867. The amount required to meet the dividend on the preference shares already issued and now to be issued is £11,375.

The Chinese Aeroplane Loan

It is announced that the subscriptions to the Chinese Aeroplane Loan were such that shareholders in Vickers will receive about 60 per cent. of the amounts for which they applied and that ordinary applicants will receive about 30 per cent.

AERONAUTICAL SPECIFICATIONS PUBLISHED

Abbreviations:—cyl.=cylinder; I.C.=internal combustion; m.=motors.

APPLIED FOR IN 1915

Published October 23, 1919

14,375. FAIREY AVIATION Co. and C. R. FAIREY. Aeroplanes.

APPLIED FOR IN 1917

Published October 23, 1919

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

15,322. F. G. CARRIE. Gyroscopic compass. (132,816.)

APPLIED FOR IN 1918

Published October 23, 1919

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

- 5,165. C. J. H. MACKENZIE-KENNEDY and F. M. T. REILLY. Holding and releasing gear for use in aircraft. (132,824.)
- 8,185. G. E. BRADSHAW and A.B.C. MOTORS, LTD. I.C. engines. (132,827.)
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